University of the State of New York

NEW YORK STATE MUSEUM

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1902

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APPENDIXES 7-9

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ALBANY
UNIVERSITY OF THE STATE OF NEW YORK
1904

University of the State of New York

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Appendix 7

Botany 6

Museum bulletin 67

6 Report of the State Botanist 1902

Published monthly by the

University of the State of New York

BULLETIN 286 MAY 1903

New York State Museum

FREDERICK J. H. MERRILL Director
CHARLES H. PECK State Botanist

Bulletin 67

BOTANY 6

REPORT OF THE STATE BOTANIST 1902

BY

CHARLES H. PECK

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University of the State of New York

New York State Museum

Frederick J. H. Merrill Director
Charles H. Peck State Botanist

Bulletin 67

BOTANY 6

REPORT OF THE STATE BOTANIST 1902

To the Regents of the University of the State of New York

I have the honor of submitting to you the report of work done in the botanical department of the State Museum during the past year.

Specimens of plants for the herbarium have been collected in the counties of Albany, Columbia, Essex, Fulton, Hamilton, Herkimer, Oneida, Rensselaer, Saratoga, Suffolk, Washington and Westchester. Specimens have been received from correspondents that were collected in the counties of Albany, Cayuga, Delaware, Erie, Essex, Herkimer, Monroe, New York, Oneida, Onondaga, Ontario, Saratoga, Schenectady, Seneca, Schoharie, St Lawrence, Suffolk, Tioga, Wayne and Westchester.

The specimens collected and contributed represent 289 species, of which 235 belong to the collections of the botanist, 54 to those of correspondents; 59 are new to the herbarium, 230 are now more fully and completely represented than before. Of the 59 species, 17 are considered new species and are herein described as such. Of these, 15 are among the collections of the botanist, two belong to those of correspondents. All of the new species are fungi. The number of species added to the flora of the State is 73, but 14 of these have previously been united with other species either as forms or varieties. They have recently been published as distinct species and are now included in the additions to our flora. A list of the species of which specimens have been added to the herbarium is marked **A**.

Names of species added to our flora, together with notes concerning their habitats, localities, time of collection of the specimens and descriptions of new species, are contained in a part of the report marked C.

The number of persons who have contributed specimens is 52. Their names and their respective contributions are recorded in a part of the report marked B. Some of these contributions consist of specimens of extralimital species and are not included in the enumeration just given. Some of the specimens were sent for identification; but, if for any reason their preservation seemed desirable and they were in sufficiently good condition, they have been preserved and credited to the sender as a contribution. The number of those who have sent specimens for identification is 90. The number of species identified for them is 1054. These are chiefly fungi.

Remarks and results of observations on previously reported species, new stations of rare plants, unusual habitats and descriptions of new varieties are given under D.

During summer and early autumn the weather was unusually wet and showery, a condition often supposed to be favorable to mushroom growth. Nevertheless, the result was by no means an abundant crop. Many species which in ordinarily moist seasons grow gregariously or are scattered through fields and woods in abundance were either wholly wanting or were few and far apart. Certain species of Amanita, Lepiota, Lactarius and Russula, which are usually common were noticeably scarce or not seen at all. The common mushroom crop was almost a complete failure. The prevailing low temperature combined with an excess of moisture probably prevented the development of the mycelium and caused the absence of many species. But opportunity was afforded for the trial of the edible qualities of several of our wild mushrooms. Of those tested, eight species have been found edible. Colored figures of natural size have been prepared to illustrate these, and descriptions have been written according to the plan followed in similar cases in previous reports. These descriptions constitute a part of the report marked E.

The investigation of our Crataegus flora, which was begun last year, has been continued. The close resemblance many of our

species of Crataegus have to each other and the need of a correct knowledge of all their distinguishing characters in order to identify the species satisfactorily, make it necessary to have specimens showing flowers, mature fruit, immature and mature foliage. Our species blossom in May and early in June, but do not ripen their fruit till late in August, during September and early in October. It is therefore necessary to make at least two collections of samples from each individual tree or shrub to be identified. One taken in flowering time will show the flowers and young leaves, the other taken in fruiting time should show the ripe fruit and mature leaves. It is desirable also to have samples of young and vigorous shoots with their mature leaves, which often differ somewhat from the leaves of ordinary shoots; also of twigs of the first and second year's growth and of the early growth of the season with stipules and thorns. Specimens of all the unrecognized species of Crataegus growing in the vicinity of Albany and in the Champlain valley from Fort Ann on the south to Westport on the north and in North Elba have been collected. The localities in the immediate vicinity of Albany have been visited several times; those in the Champlain valley, in North Elba and the country between it and Westport twice; once in May and early June and once in September. A large amount of material has been collected, duplicate specimens having in all cases been taken. By reason of the peculiar difficulties attending the identification of these plants, owing to the confusion of species and the omission in older descriptions of any record of characters now deemed important, it has seemed best to avail myself of the aid of Professor C. S. Sargent, the distinguished dendrologist and specialist in this branch of botany. Accordingly a set of these specimens has been sent to him for identification.

Mr F. E. Fenno, an active botanist of Tioga county, has from time to time contributed to the herbarium specimens of rare and interesting plants from his county. He has given much time to the collection and study of the plants of his region and has recently sent me a very full annotated list of the species known from his own observation to occur there. In all doubtful cases these have been identified by specialists. The *Illustrated Flora*

has chiefly been followed in the arrangement and nomenclature of the list, and the territory covered is described as the Susquehanna valley and adjacent hills of Tioga county. This territory includes the greater part of the southern half of the county. It is apparently rich in species, the list containing a remarkable number for such a limited region. It has therefore seemed to me desirable that this list should be published. It, with the *Flora of the Upper Susquehanna* by W. N. Clute, will give a very fair knowledge of what species of flowering plants and ferns occur in the southern central part of our State and will be an aid in determining the range of little known and rare species. It has therefore been added to this report as appendix F.

Respectfully submitted

CHARLES H. PECK
State Botanist

Albany, Dec. 3, 1902

A

PLANTS ADDED TO THE HERBARIUM

New to the herbarium

Delphinium ajacis *L.*
Lepidium ruderale *L.*
Hypericum boreale (*Britton*) *Bickn.*
Lactuca scariola *L.*
Hypochaeris radicata *L.*
Artemisia stelleriana *Bess.*
Xanthium commune *Britton*
Aster roscidus *Burgess*
Matricaria matricarioides (*Less.*) *Porter*
Antennaria fallax *Greene*
A. ambigens (*Greene*) *Fern.*
A. brainerdii *Fern.*
A. petaloidea *Fern.*
Pottia riparia *Aust.*
Tortula ruralis *Ehrh.*
Racomitrium heterostichum *Brid.*
Encalypta rhabdocarpa *Schwaegr.*
Hypnum lindbergii *Limpt.*
Liochlaena lanceolata *Nees*
Tricholoma radicatum *Pk.*
Clitocybe inversa (*Scop.*) *Fr.*
Mycena rugosoides *Pk.*
Hygrophorus subrufescens *Pk.*
Lactarius luteolus *Pk.*
Russula magnifica *Pk.*
R. earlei *Pk.*
Marasmius biformis *Pk.*
M. leptopus *Pk.*
M. insititius *Fr.*
M. thujinus *Pk.*
Leptonia hortensis *Pk.*
Flammula pusilla *Pk.*
Craterellus subundulatus *Pk.*
Clavaria crassipes *Pk.*
Secotium warnei *Pk.*
Licea variabilis *Schrad.*
Aecidium ligustri *Strauss*
Cintractia affinis *Pk.*
Phyllosticta grisea *Pk.*
Gloeosporium phaeosorum *Sacc.*
Sporotrichum poae *Pk.*
Penicillium digitatum (*Fr.*) *Sacc.*
P. pallidofulvum *Pk.*
Macrosporium lagenariae *Thum.*
Fusarium laxum *Pk.*
Stilbum resinariae *Pk.*
Helvella ambigua *Karst.*
Detonia fulgens (*Pers.*)*Rehm*
Geopyxis carbonaria *A. & S.*
Calloria caulophylli (*E. &E.*)*Rehm*
Lachnum inquilinum (*Karst.*) *Schroet.*
Sclerotinia smilacinae *Durand*
Ciboria americana *Durand*
C. sulphurella (*E. &E.*)*Rehm*
Caldesia sabinae (*Dellot*) *Rehm*
Peziza violacea *Pers.*
Helotium scut. vitellinum *Rehm*
Ascobolus atrofuscus *Ph. & Pl.*
Melanospora vervecina (*Desm.*) *Fckl.*

Not new to the herbarium

Actaea rubra *L.*
Agrimonia striata *Mx.*
Agrostis stolonifera *L.*
Amorpha fruticosa *L.*
Amelanchier canadensis (*L.*) *Med.*
Anthemis cotula *L.*
Antennaria canadensis *Greene*
A. neglecta *Greene*
A. plantaginea *R. Br.*
A. neodioica *Grcene*
Arenaria groenlandica (*Retz.*) *Spreng.*
Arisaema pusillum (*Pk.*) *Nash*
Asclepias exaltata *Muhl.*
Aster concinnus *Willd.*
A. schreberi *Nees*
Brassica rapa *L.*
B. arvensis (*L.*) *B. S. P.*
Blephilia hirsuta (*Pursh*) *Torr.*
B. ciliata (*L.*) *Raf.*
Calamagrostis inexpansa *Gray*
Campanula rotundifolia *L.*
Cassia nictitans *L.*
Chelidonium majus *L.*
Chrysopis graminifolia (*Mx.*) *Nutt.*
Chrysanthemum leucanthemum *L.*
Convolvulus arvensis *L.*

Convolvulus spithamaeus *L.*
Cypripedium hirsutum *Mill.*
Dianthus armeria *L.*
Drosera rotundifolia *L.*
Erigeron ramosus (*Walt.*) *B. S. P.*
E. philadelphicus *L.*
Eriophorum polystachyon *L.*
Eupatorium maculatum *L.*
Fraxinus americana *L.*
Galium concinnum *T. & G.*
Gentiana andrewsii *Griseb.*
Geranium maculatum *L.*
G. carolinianum *L.*
Habenaria clavellata (*Mx.*)
Hamamelis virginiana *L.*
Helianthus giganteus *L.*
Houstonia longifolia *Gaert.*
Hypericum mutilum *L.*
Kneiffia pumila (*L.*) *Spach*
Lactuca sagittifolia *Ell.*
Lobelia cardinalis *L.*
Lepidium virginicum *L.*
L. apetalum *Willd.*
Lilium canadense *L.*
Linaria canadensis (*L.*) *Dum.*
Lycopus communis *Bickn.*
Malus malus (*L.*) *Britton*
Malva rotundifolia *L.*
Medicago sativa *L.*
Myriophyllum humile *Raf.*
Onagra oakesiana (*Gray*) *Britton*
Origanum vulgare *L.*
Panax trifolium *L.*
Panicum lanuginosum *Ell.*
Polymnia can. radiata *Gray*
Physalis het. ambigua (*Gray*) *Rydb.*
Polygonum convolvulus *L.*
P. hartwrightii *Gray*
Potentilla anserina *L.*
P. canadensis *L.*
P. pumila *Poir.*
Quercus alexanderi *Britton*
Ranunculus abortivus *L.*
Raphanus raphanistrum *L.*
Ribes rubrum *L.*
Rhynchospora macrostachya *Torr.*
Rubus hispidus *L.*
R. procumbens *Muhl.*
R. occid. pallidus *Bail.*
Sporobolus longifolius (*Torr.*) *Wood*
Sporobolus neglectus *Nash*
Salix balsamifera (*Hook.*) *Barratt*
Salsola tragus *L.*
Sanicula gregaria *Bickn.*
Saxifraga virginiensis *Mx.*
Sibbaldiopsis tridentata (*Soland.*) *Rydb.*
Taraxacum taraxacum (*L.*) *Karst.*
T. erythrospermum *Andrz.*
Tetragonanthus deflexus (*Sm.*) *Kuntze*
Viola palmata *L.*
V. pap. domestica (*Bickn.*) *Poll.*
V. arenaria *DC.*
V. rostrata *Pursh*
Woodsia ilvensis (*L.*) *R. Br.*
Xanthium canadense *Mill.*
X. echinatum *Murr.*
Xyris caroliniana *Walt.*
Polypodium vulgare *L.*
Dicranum schraderi *W. & M.*
Hypnum oakesii *Sulliv.*
H. pratense *Koch*
H. deplanatum *Schp.*
Brachythecium starkii *Brid.*
B. salebrosum (*Hoffm.*)
Porella platyphylla *Lindb.*
Anthoceros laevis *L.*
Amanita flavoconia *Atk.*
A. caesarea *Scop.*
A. onusta *Howe*
Amanitopsis strangulata *Fr.*
A. volvata (*Pk.*) *Sacc.*
A. farinosa (*Schw.*)
Armillaria mellea *Vahl*
Tricholoma vaccinum (*Pers.*) *Fr.*
T. imbricatum *Fr.*
T. equestre *L.*
T. subacutum *Pk.*
T. silvaticum *Pk.*
Clitocybe dealbata *Sow.*
C. tortilis (*Bolt.*) *Fr.*
C. amethystina (*Bolt.*) *Fr.*
Collybia platyphylla *Fr.*
C. familia *Pk.*
C. uniformis *Pk.*
C. acervata *Fr.*
Mycena subincarnata *Pk.*
M. clavicularis *Fr.*
M. pterigena *Fr.*
Omphalia campanella (*Batsch*) *Fr*
O. umbellifera *L.*

Hygrophorus pudorinus *Fr.*
H. splendens *Pk.*
H. capreolarius *Kalchb.*
H. pratensis (*Pers.*) *Fr.*
H. nitidus *B. & C.*
H. peckii *Atk.*
Lactarius volemus *Fr.*
L. subdulcis *Fr.*
L. cinereus *Pk.*
L. griseus *Pk.*
L. parvus *Pk.*
Russula foetens (*Pers.*) *Fr.*
R. granulata *Pk.*
R. crustosa *Pk.*
R. variata *Banning*
R. olivascens *Fr.*
R. rugulosa *Pk.*
R. simillima *Pk.*
Cantharellus cibarius *Fr.*
C. minor *Pk.*
C. cinnabarinus *Schw.*
C. cinereus *Fr.*
C. infundibuliformis (*Scop.*)
Marasmius subnudus *Pk.*
M. polyphyllus *Pk.*
M. filopes *Pk.*
Lenzites sepiaria *Fr.*
Pholiota vermiflua *Pk.*
P. togularis (*Bull.*) *Fr.*
P. squarrosoides *Pk.*
P. confragosa *Fr.*
Cortinarius rimosus *Pk.*
C. berlesianus *S. & C.*
Inocybe geophylla *Sow.*
Stropharia depilata (*Pers.*) *Fr.*
S. johnsoniana *Pk.*
Hypholoma subaquilum *Banning*
Coprinus micaceus *Fr.*
Boletus auriporus *Pk.*
B. clintonianus *Pk.*
Polyporus sulphureus (*Bull.*) *Fr.*
P. resinosus (*Schrad.*) *Fr.*
P. benzoinus (*Wahl.*) *Fr.*
P. caesius (*Schrad.*) *Fr.*
Trametes variiformis *Pk.*
T. serialis *Fr.*
Fomes pinicola *Fr.*
F. fomentarius (*L.*) *Fr.*
F. roseus *A. & S.*
Polystictus abietinus *Fr.*
Daedalea quercina (*L.*) *Pers.*
D. unicolor (*Bull.*) *Fr.*
Merulius tenuis *Pk.*
M. fugax *Fr.*
M. niveus *Fr.*
Phlebia radiata *Fr.*
Hydnum imbricatum *L.*
H. repandum *L.*
H. albidum *Pk.*
H. caput-ursi *Fr.*
Radulum orbiculare *Fr.*
Odontia lateritia *B. & C.*
Tremellodon gelatinosum (*Scop.*) *Pers.*
Craterellus cornucopioides (*L.*) *Pers.*
Clavaria botrytis *Pers.*
C. cristata *Pers.*
C. stricta *Pers.*
C. muscoides *L*
C. ligula *Fr.*
C. argillacea *Fr.*
C. tsugina *Pk.*
Calocera cornea *Fr.*
Lycoperdon gemmatum *Batsch*
L. subincarnatum *Pk.*
Granularia pulvinata (*Schw.*) *White*
Didymium melanospermum (*Pers.*) *Macb.*
Leocarpus fragilis (*Dicks.*) *R.*
Trichia favoginea (*Batsch*) *Pers.*
Hemitrichia clavata (*Pers.*) *R.*
Ustilago zeae (*Beckm.*) *Ung.*
Puccinia podophylli *Schw.*
Urocystis anemones (*Pers.*)
Gymnosporangium clavipes *C. & P.*
Septoria ludwigiae *Cke.*
Glomerularia corni *Pk.*
Botrytis vulgaris *Fr.*
Helvella macropus (*Pers.*) *Karst.*
Geoglossum ophioglossoides (*L.*) *Sacc.*
Mitrula vit. irregularis (*Pk.*) *Sacc.*
Leotia lubrica (*Scop.*) *Pers.*
Cudonia circinans (*Pers.*) *Fr.*
C. lutea (*Pk.*) *Sacc.*
Dasyscypha agassizii (*B. & C.*) *Sacc.*
Lachnea scutellata (*L.*) *Sow.*
L. scubalonta *C. & G.*
Sarcoscypha floccosa *Schw.*
Peziculа carpinea (*Pers.*) *Tul.*

Pezicula acericola *Pk.*
Exoascus confusus *Atk.*
Sphaerotheca humuli (*DC.*) *Burr.*
Hypomyces lactifluorum *Schw.*
Xylaria digitata (*L.*) *Grev.*
Colpoma morbidum (*Pk.*) *Sacc.*

B

CONTRIBUTORS AND THEIR CONTRIBUTIONS

Mrs A. M. Smith and Mrs C. W. Harris, Brooklyn

Amblystegium fluitans *De N.*
A. riparium *B. & S.*
Amphoridium lapponicum *Schp.*
Anomodon apiculatus *B. & S.*
A. attenuatus *Huebn.*
A. obtusifolius *B. & S.*
A. rostratus *Schp.*
Aulacomnion palustre *Schwaegr.*
Barbula caespitosa *Schwaegr.*
B. convoluta *Hedw.*
Bartramia oederiana *Swartz*
B. pomiformis *Hedw.*
Brachythecium acuminatum *Bv.*
B. laetum *Brid.*
B. populeum *B. & S.*
B. rivulare *B. & S.*
B. salebrosum *B. & S.*
B. starkii *Brid.*
B. velutinum *B. & S.*
Bryum bimum *Schreb.*
B. caespiticium *L.*
B. capillare *L.*
B. nutans *Schreb.*
B. roseum *L.*
B. torquescens *B. & S.*
Buxbaumia aphylla *L.*
Catherinea undulata *Bv.*
Ceratodon purpureus *Brid.*
Climacium dendroides *W. & M.*
Cylindrothecium cladorrhizans *Schp.*
Dicranum flagellare *Hedw.*
D. montanum *Hedw.*
D. longifolium *Hedw.*
D. schraderi *W. & M.*
D. viride *Schp.*
D. drummondi *Muell.*
Diphyscium foliosum *Mohr.*
Encalypta rhabdocarpa *Schwaegr.*
E. streptocarpa *Hedw.*
Fissidens adiantoides *Hedw.*
Fontinalis biformis *Sullv.*
F. lescurii *Sullv.*
Funaria hygrometrica *Sibth*
Georgia pellucida *Rabenh.*
Grimmia apocarpa *Hedw.*
G. leucophaea *Grev.*
Gymnostomum rupestre *Schwaegr.*
Hedwigia ciliata *Ehrh.*
Hylocomium brevirostre *B. & S.*
H. squarrosum *B. & S.*
H. triquetrum *B. & S.*
Homalia jamesii *B. & S.*
H. trichomanoides *B. & S.*
Hypnum chrysophyllum *Brid.*
H. cordifolium *Hedw.*
H. cuspidatum *L.*
H. deplanatum *Schp.*
H. fertile *Sendt.*
H. haldanianum *Grev.*
H. hispidulum *Brid.*
H. imponens *Hedw.*
H. lindbergii *Limpt.*
H. recurvans *Schwaegr.*
H. rusciforme *B. & S.*
H. schreberi *Willd.*
H. serrulatum *Hedw.*
H. splendens *Hedw.*
H. stellatum *Schreb.*
H. strigosum *Hoffm.*
H. uncinatum *Hedw.*
Leptobryum pyriforme *Schp.*
Leucobryum glaucum *Schp.*
Leucodon julaceus *Sullv.*
Myurella careyana *Sullv.*
Mnium affine *Bland.*
M. cuspidatum *Hedw.*
M. drummondi *B. & S.*
M. medium *B. & S.*
M. orthorrhynchum *B. & S.*
M. punctatum *Hedw.*
M. rostratum *Schp.*
M. serratum *Brid.*
M. spinulosum *B. & S.*
M. stellare *Hedw.*

Neckera oligocarpa *B. & S.*
N. pennata *Hedw.*
Oncophorus wahlenbergii *Brid.*
Orthotrichum fallax *Schp.*
O. anomalum *Hedw.*
Porotrichum alleghaniense *Grout*
Philonotis fontana *Brid.*
P. muhlenbergii *Brid.*
Pottia riparia *Aust.*
Plagiothecium denticulatum *B. & S.*
P. elegans *Schp.*
P. pulchellum *B. & S.*
P. striatellum *Lindb.*
Pogonatum alpinum *Roehl.*
P. tenue *E. G. Britton*
Racomitrium heterostichum *Brid.*
R. microcarpum *Brid.*
Rhabdoweisia denticulata *B. & S.*
Seligeria doniana *C. Muell.*
Sphagnum acutifolium *Ehrh.*
S. cuspidatum *Ehrh.*
S. quinquefarium *Warnst*
S. squarrosum *Pers.*
Tortula caespitosa *H. & G.*
T. tortuosa *Ehrh.*
Thuidium delicatulum *Mitt.*
T. recognitum *Lindb.*
T. paludosum *R. & H.*
Anthoceros laevis *L.*
Asterella hemisphaerica *Bv.*
Bazzania trilobata *S. F. Gray*
Blepharistoma trichophylla *Dumort.*
Cephalozia curvifolia *Dumort.*
C. multiflora *Spruce*
Conocephalus conicus *Dumort.*
Frullania asagrayana *Mont.*
Geocalyx graveolens *Nees*
Jungermannia barbata *Schreb.*
Kantia trichomanis *S. F. Gray*
Liochlaena lanceolata *Nees*
Lejeunea serpyllifolia *Libert*
Porella platyphylla *Lindb.*
Ptilidium ciliare *Nees*
Scapania nemorosa *Dumort.*
Trichocolea tomentella *Dumort.*

Mrs E. G. Britton, New York

Dicranella heteromalla *Schp.*
Dicranum longifolium *Hedw.*
D. fuscescens *Turn.*
Dicranodontium longirostre *B. & S.*
Weissia ulophylla *Ehrh.*
W. americana *Lindb.*
Didymodon cylindricarpus *B. & S.*
Georgia pellucida *Rabenh.*
Tortula ruralis *Ehrh.*
Mnium affine *Bland.*
M. spinulosum *B. & S.*
Ulota crispa *Brid.*
Aulacomnion heterostichum *B. & S.*
Polytrichum juniperinum *Willd.*
Fontinalis dalecarlica *B. & S.*
Anomodon rostratus *Schp.*
A. viticulosus *H. & T.*
Webera proligera (*Lindb.*)
Drummondia clavellata *Hook.*
Bryum nutans *Schreb.*
B. concinnatum *Spruce*
Pylaisaea velutina *B. & S.*
Raphidostegium recurvans *Schwaegr.*
R. jamesii *Lesq.*
R. laxepatulum *L. & J.*
Plagiothecium denticulatum *B. & S.*
P. mullerianum *Schp.*
P. striatellum *Lindb.*
Hypnum fertile *Sendt.*
H. splendens *Hedw.*
H. umbratum *Ehrh.*
H. oakesii *Sulliv.*
H. crista-castrensis *L.*
H. pratense *Koch*
Pogonatum alpinum *Roehl*
Typhula muscicola *Fr.*

Miss H. C. Anderson, Lambertville N. J.

Agaricus abruptus *Pk.*
Armillaria mellea *Vahl*
Cantharellus cibarius *Fr.*
Hydnum cyaneotinctum *Pk.*
Panus strigosus *B. & C.*
Strobilomyces strobilaceus (*Scop.*)

Miss M. L. Overacker, Syracuse

Hepatica acuta (*Pursh*) *Britton*
Viola selkirkii *Pursh*
V. renifolia *Gray*
Claytonia virginica *L.*
C. caroliniana *Mx.*
Asclepias exaltata *Muhl.*
Ribes prostratum *L'Her.*
R. lacustre *Poir.*
Tiarella cordifolia *L.*
Trillium grandiflorum (*Mx.*) *Salisb.*
Polymnia can. radiata *Gray*
Lycoperdon gemmatum *Batsch*

Miss V. S. White, New York

Tricholoma fallax *Pk.*
Clitocybe marginata *Pk.*
Russula adusta *Fr.*
R. sordida *Pk.*
R. basifurcata *Pk.*
R. purpurina *Q.* & *S.*
R. fingibilis *Britz.*
Marasmius viticola *B.* & *C.*
Leptonia serrulata (*Pers.*) *Fr.*
Flammula granulosa *Pk.*
Galera lateritia *Fr.*
Boletus scabripes *Pk.*
B. purp. fumosus *Pk.*
Polyporus confluens (*A.* & *S.*) *Fr.*
P. carpineus *Sow.*

Miss Emma S. Thomas, Schoharie

Daedalea unicolor *Fr.*
Taraxacum taraxacum (*L.*) *Karst.*
Calvatia maxima (*Schaeff.*) *Morg.*

Miss Flora Zinsmeister, Syracuse

Geaster triplex *Jungh.*

Mrs A. C. Shanks, Round Lake

Polypodium vulgare *L.*

Mrs P. B. Brandreth, Ossining

Polyporus umbellatus *Fr.*

Mrs E. C. Anthony, Gouverneur

Secotium warnei *Pk.*
Cystopus tragopogonis (*Pers.*) *Schroet*

Miss Edith Wilkinson, Tannersville

Pluteus cervinus albipes *Pk.*

F. E. Fenno, Nichols

Crataegus tomentosa *L.*
Potentilla pumila *Poir.*
Taraxacum erythrospermum *Andrz.*
Ilysanthus gratioloides (*L.*) *Benth.*
Blephilia hirsuta (*Pursh*) *Torr.*
Polygonum hartwrightii *Gray*
Salsola tragus *L.*
Juncus pelocarpus *E. Meyer*
Agrostis stolonifera *L.*
Panicum lanuginosum *Ell.*

F. S. Earle, New York

Amanitopsis volvata (*Pk.*) *Sacc.*
Clitocybe tort. gracilis *Pk.*
Russula earlei *Pk.*
Hypholoma incertum *Pk.*
Stropharia sicc. radicata *Pk.*

G. F. Atkinson, Ithaca

Tricholoma acre *Pk.*
Hygrophorus peckii *Atk.*
Merulius tenuis *Pk.*
Cudonia circinans (*Pers.*) *Fr.*
Clavaria muscoides *L.*
C. pinophila *Pk.*
Helvella ambigua *Karst.*
H. elastica *Bull.*

S. Sherwood, Delhi

Agaricus placomyces *Pk.*

D. Griffiths, Takoma Park, D. C.

Ustilago aristidae *Pk.*

H. C. Magnus, Albany

Penicillium digitatum (*Fr.*) *Sacc.*

B. L. Robinson, Cambridge, Mass.

Acalypha gracilescens *Gray*
Acer rubrum *L.*
Amianthum muscaetoxicum *Gray*
Antennaria brainerdii *Fern.*
A. canadensis *Greene*
A. fallax *Greene*
A. neglecta *Greene*
A. neodioica *Greene*
A. parlinii *Fern.*
A. parl. arnoglossa *Fern.*
A. petaloidea *Fern.*
A. plantaginea *R. Br.*
A. rupicola *Fern.*
Anthoxanthum odoratum *L.*
Arenaria serpyllifolia *L.*
Aristida dichotoma *Mx.*
Aspidium crist. x marginale *Daven.*
Asplenium viride *Huds.*
Aster divaricatus *L.*
A. glomeratus *Bernh.*
A. herveyi *Gray*
A. junceus *Ait.*
A. linariifolius *L.*
A. long. villicaulis *Gray*
A. polyphyllus *Willd.*
A. schreberi *Nees*
A. subulatus *Mx.*
A. lind. comatus *Fern.*
Atriplex arenaria *Nutt.*
Bidens bipinnata *L.*
B. discoidea *Britton*
B. trichosperma *Britton*
Botrychium matricariaefolium *Braun*
B. virginianum *Sw.*
Carex albicans *Willd.*
Carex arctata *Boott*
C. backii *Boott*
C. capillaris *L.*
C. castanea *Wahl.*
C. cephalophora *Muhl.*
C. chordorrhiza *Ehrh.*
C. crawfordii *Fern.*
C. cristata *Schw.*
C. deflexa *Hornem.*
C. eburnea *Boott*
C. exilis *Dew.*
C. fernaldii *Bail.*
C. fusca *All.*
C. gynocrates *Wormsk.*
C. interior *Bail.*
C. intumescens *Rudge*
C. laxiflora *Lam.*
C. lenticularis *Mx*
C. livida *Willd.*
C. longirostris *Torr.*
C. lurida *Wahl.*
C. oligosperma *Mx.*
C. pedunculata *Muhl.*
C. pilulifera *L.*
C. prasina *Wahl.*
C. pubescens *Muhl.*
C. scorsa *Howe*
C. stipata *Muhl.*
C. tenella *Schk.*
C. teret. ramosa *Boott*
C. tetan. woodii *Bail.*
C. tener. richii *Fern.*
C. umbel. tonsa *Fern.*
C. umbel. brevirostris *Boott*
C. vaginata *Tausch*

Carex varia *Muhl.*
C. vesicaria *L.*
Campanula americana *L.*
Chrysopsis falcata *Ell.*
Clitoria mariana *L.*
Crataegus punctata *Jacq.*
Cyperus nuttallii *Torr.*
C. diandrus *Torr.*
Discopleura capillacea *DC.*
Dirca palustris *L.*
Desmodium acuminatum *DC.*
Elatine americana Arn.
Eleocharis ovata *R. Br.*
E. intermedia *Schultes*
E. palustris *R. Br.*
Elymus striatus *Willd.*
E. virginianus *L.*
Epilobium hornemanni *Reich.*
Eriocaulon decangulare *L.*
Eriophorum alpinum *L.*
Equisetum variegatum *Schleich.*
Eupatorium hyssopifolium *L.*
Euphorbia polygonifolia *L.*
Euphrasia amer. canadensis *Robins.*
E. oakesii *Wett.*
E. williamsii *Robins.*
Frimbristylis capillaris *Gray*
Festuca elatior *L.*
F. nutans *Willd.*
Galium latifolium *Mx.*
Geum ciliatum *Pursh*
Gerardia skinneriana *Wood*
Gratiola aurea *Muhl.*
Hemicarpha subsquarrosa *Nees*
Heuchera villosa *Mx.*
Halenia deflexa *Grisch.*
Hypericum nudicaule *Walt.*
Iris virginica *L.*
Juncus brachycephalus *Buch.*
J. dudleyi *Wieg.*
J. nodosus *L.*
J. ten. williamsii *Fern.*
J. subtilis *Meyer*
Krigia virginica *Willd.*
Lobelia kalmii *L.*
Luzula vernalis *DC.*
Lycopodium clav. monostachyon *G. & H.*
L. obscurum *L.*
L. sabinaefolium *Willd.*
Lycopodium sitchense *Rup.*
L. tristachyum *Pursh*
Lycopus sessilifolius *Gray*
Lespedeza capitata *Mx.*
Muhlenbergia willdenovii *Trin.*
Oryzopsis asperifolia *Mx.*
Panicum pauciflorum *Gray*
Paronychia argyrocoma *Nutt.*
Pedicularis furbishiae *Wats.*
Pentstemon pubescens *Soland.*
Pinus contorta *Dougl.*
Pluchea camphorata *DC.*
Podostemon ceratophyllus *Mx.*
Polygola nuttallii *T. & G.*
Poa compressa *L.*
P. pratensis *L.*
P. serotina *Ehrh.*
Polygonum acre *H. B. K.*
P. maritimum *L.*
P. ram. atlanticum *Robins.*
P. viviparum *L.*
Polygonella articulata *Meisn.*
Potamogeton het. graminifolius *W. & C.*
P. lucens *L.*
P. pectinatus *L.*
P. robbinsii *Oakes*
P. vaseyi *Robbins*
P. zosteraefolius *Schum.*
Potentilla canadensis *L.*
P. norvegica *L.*
Pyrus arbutifolia *L.*
Quercus prinoides *Willd.*
Q. ilicifolia *Wang.*
Ranunculus fascicularis *Muhl.*
R. repens *L.*
R. septentrionalis *Poir.*
Rhynchospora capillacea *DC.*
Rosa nitida *Willd.*
Rotala ramosior *Koehne*
Rubus arg. randii *Bail.*
Ruppia maritima *L.*
Salbatia stellaris *Pursh*
Salicorne mucronata *Bigel.*
Salix balsamifera *Barratt*
Salsola kali *L.*
Sanguisorba canadensis *L.*
Saxifraga leucanthemifolia *Mx.*
S. virginiensis *Mx.*
Senecio obovatus *Muhl.*
Scirpus atrocinctus *Fern.*

Scirpus caespitosus *L.*
S. deb. williamsii *Fern.*
S. pauciflorus *Light.*
S. peckii *Britton*
Sibbaldia procumbens *L.*
Silene antirrhina *L.*
Solidago humilis *Pursh*
Spartina juncea *Willd.*
Sporobolus aspericaulis *Scrib.*
Trifolium hybridum *L.*
Vaccinium corymbosum *L.*
Veronica serp. borealis *Laest.*
Vicia sativa *L.*
Viola arenaria *DC.*

Ralph E. Matteson, Grand Rapids Mich.

Polyporus obtusus *Berk.*
Irpex crassus *B. & C.*

N. L. Britton, New York

Rhexia aristosa *Britton*

C. E. Clark, Newark

Clitocybe dealbata deformata *Pk.*

J. M. Clarke, Albany

Clitocybe illudens *Schw.*

F. S. Boughton, Pittsford

Polyporus squamosus (*Huds.*) *Fr.*

W. R. Griffiths, Douglaston

Eucalyptus calophylla *R. Br.*
Schinus molle *L.*
Arbutus menziesii *Pursh*

F. J. Braendle, Washington D. C.

Clitocybe morbifera *Pk.*
Tylostoma punctatum *Pk.*
Stropharia siccipes *Karst.*
Panaeolus epimyces *Pk.*

A. M. Baker, Coeymans

Pholiota vermiflua *Pk.*

N. M. Glatfelter, St Louis Mo.

Bolbitius glatfelteri *Pk.*
Gyromitra brunnea *Underw.*
Polyporus giganteus (*Pers.*) *Fr*

C. J. Elting, Highland

Arisaema pusillum (*Pk.*) *Nash*
Hypholoma incertum *Pk.*

E. J. Durand, Ithaca

Geopyxis carbonaria *A. & S.*
Peziza violacea *Pers.*
P. fusicarpa *Ger.*
Detonia fulgens (*Pers.*) *Rehm*
Calloria caulophylli (*E. & E.*) *Rehm*
Lachnum aquilinum (*Karst.*) *Schroet.*
Sclerotinia smilacinae *Durand*
Ciboria sulphurella (*E. & E.*) *Rehm*
C. americana *Durand*
Ascobolus atrofuscus *P. & P.*
Caldesia sabinae (*Dell.*) *Rehm*

J. E. S. Heath, Waterloo Ia.

Scleroderma vulgare *Fr.*
Calvatia craniiformis (*Schw.*) *Morg.*
Geaster mammosus *Chev.*

D. R. Sumstine, Kittanning Pa.

Lactarius sumstinei *Pk.*
Boletus parasiticus *Bull.*
Russula carlei *Pk.*

W. P. Judson, Albany

Lilium canadense *L.*

C. S. Sargent, Jamaica Plain Mass.

Populus nigra elegans *Bail.*

A. R. Sweetzer, Eugene Ore.

Sparassis herbstii *Pk.*

P. M. Van Epps, Glenville

Chlorosplenium acruginosum (*Oeder*) *DeN.*

M. S. Baxter, Rochester

Buxbaumia indusiata *Brid.*

H. P. Burt, New Bedford Mass.

Agaricus placomyces *Pk.*

E. M. Freeman, Minneapolis Minn.

Entoloma graveolens *Pk.*
Polyporus obtusus *Berk.*

J. C. Arthur, Lafayette Ind.

Aecidium euphorbiae *Schw.*
Puccinia xanthii *Schw.*

R. B. Mackintosh, Peabody Mass.

Lepiota rhacodes *Vitt.*
Agaricus pusillus *Pk.*
Lepiota cristata *A. & S.*

B. C. Williams, Newark

Clitocybe multiceps *Pk.*
Clitocybe dealb. deformata *Pk.*

F. C. Stewart, Geneva

Gloeosporium phacosorum *Sacc.*
Sporotrichum poae *Pk.*

A. P. Saunders, Clinton

Morchella angusticeps gracilis *Pk.*

S. E. Jelliffe, New York

Thamnidium elegans *Lk.*

E. B. Sterling, Trenton N. J.

Agaricus tabularis *Pk.*
A. haemorrhoidarius *Schulz.*
Coprinus comatus *Fr.*
C. atramentarius *Bull.*
Phallus imperialis *Schulz.*
Secotium warnei *Pk.*
Catastoma circumscissum *B. & C.*
Calvatia pachyderma *Pk.*

Charles McIlvaine, Cambridge Md.

Merulius lacrymans (*Jacq.*) *Fr.*

G B. Fessenden, Boston Mass.

Cortinarius intrusus *Pk.*

G. B. Morris, Waltham Mass.

Cortinarius squamulosus *Pk.*
Boletus spectabilis *Pk.*
Coprinus silvaticus *Pk.*
Boletinus paluster *Pk.*

J. G. Jack, Jamaica Plain Mass.

Crataegus acutiloba *Sarg.*
C. anomala *Sarg.*
C. coccineoides *Ashe*
C. collina *Chapm.*
C. canadensis *Sarg.*
C. champlainensis *Sarg.*
C. densiflora *Sarg.*
C. dilatata *Sarg.*
C. ellwangeriana *Sarg.*
C. fecunda *Sarg.*
C. flabellata (*Spach*) *Rydb.*
C. holmesiana *Ashe*
C. illinoiensis *Ashe*
C. integriloba *Sarg.*
C. intricata *Lange*
C. jonesae *Sarg.*
Crataegus laurentiana *Sarg.*
C. lucorum *Sarg.*
C. macracantha *Lodd.*
C. mollis (*T. & G.*) *Scheele*
C. peoriensis *Sarg.*
C. pedicellata *Sarg.*
C. pastorum *Sarg.*
C. praecox *Sarg.*
C. pruinosa *Wend.*
C. rotundifolia (*Ehrh.*)
C. scabrida *Sarg.*
C. submollis *Sarg.*
C. succulenta *Lk.*
C. suborbiculata *Sarg.*
C. venusta *Beadle*

R. A. Harper, Madison Wis.

Pluteus patricius *Schulz.*
P. cervinus (*Schaeff.*) *Fr.*
Irpex fuscoviolaceus *Fr.*
Polyporus aurantiacus *Pk.*
Gyromitra sphaerospora (*Pk.*) *Sacc.*
Peziza amplispora *C. & P.*
Puccinia mesomegala *B. & C.*
Septoria salliae *Ger.*

W. L. Smith, Albany

Macrosporium lagenariae *Thum.*

C. M. C. Lloyd, Gloversville

A specimen of "six-leaved" clover

New York State Agric. Society

Miscellaneous collection of dried plants, 398 numbers

C

SPECIES NOT BEFORE REPORTED

Delphinium ajacis L.

Near Niagara Falls. August. E. M. Wilcox. This is an introduced plant, which is cultivated for its flowers, but it sometimes escapes from cultivation. It resembles the closely allied D. consolida, from which it may be distinguished by its pubescent seed vessels.

Hypericum boreale (Britton) Bickn.

Shore of Piseco lake. August. Closely related to the common H. mutilum but separable from it by the stem, which is scarcely branched, except at the top, by the small bracts of the cymes being similar in shape to the leaves and specially by the seed vessels, which are decidedly longer than the sepals.

Vicia angustifolia Roth

Adams, Jefferson co. June. This is closely related to V. sativa, the common vetch, as a variety of which it is recorded in 46th Museum report, p.122. It is now considered a valid species and may be separated from its near relative by its more narrow linear or oblong, pointed leaflets.

Kneiffia longipedicellata Small

Sandy soil near Eastport, Suffolk co. August. A peculiar form having a flexuous much branched stem and leaves a little broader than in the typical form. A specimen collected near Quogue more nearly represents the typical form. The large flower and long peduncle are distinguishing characters of the species.

Lactuca virosa L.

This introduced plant is rapidly spreading and is already found growing freely in waste places about many of our cities and villages. It was formerly confused with L. scariola, a species which it closely resembles and which may be distinguished by its lower leaves being sinuate or sinuate pinnatifid and by its pale achenes. Specimens of this species were collected near Trenton Falls in August.

Hypochaeris radicata L.

Fields and roadsides. Cedarhurst, Nassau co. June. G. D. Hulst. Introduced. It has also been reported from Richmond county.

Artemisia stelleriana Bess.

Seabeach. Rockaway L. I. July. G. D. Hulst. The beach wormwood is very distinct from our other species of this genus and may easily be recognized by its dense, whitish coat of tomentum and its large, erect and crowded heads of flowers.

Xanthium commune Britton

Moist ground. Whitehall. September. In our specimens the hairs on the lower half of the beaks and prickles of the burs are whitish, instead of brown.

Aster roscidus Burgess

Roadside. Piseco, Hamilton co. August. A beautiful aster related to the large leaved aster, A. macrophyllus, but easily distinguished by the abundance of the glands on the upper part of the stem and also on the leaves.

Matricaria matricarioides (Less.) Porter

Waste places and roadsides. Lansingburg. June. This introduced plant is easily separated from our other species of the genus by the absence of ray flowers. In size and foliage it resembles the common mayweed, Anthemis cotula.

Antennaria fallax Greene

Bushy places, groves and borders of woods. Menands and Westport. May.

Antennaria ambigens (Greene) Fern.

Roadsides. Sandlake, Rensselaer co. May. Related to the preceding species but separable from it by its shorter stem, broader and closer stem leaves, which are glandular on the upper surface, and by the glandular, purplish hairs of the stolens.

Antennaria brainerdii Fern.

Pastures and shaded banks. Westport and Keene, Essex co. May. Related to A. neodioica, from which it may be sepa-

rated by the purple hairs of the stem, though these are sometimes few and scattered and easily overlooked. The plants of the Keene locality grew on a moist, partly shaded bank near the Willey house and are larger than the others.

Antennaria petaloidea Fern.

In a recent clearing. North Elba, Essex co. June.

Plantago halophila Bickn.

Sandy soil near Eastport, Suffolk co. and near Saranac lake, Franklin co. September. This plantain has generally been considered a form of P. major, but it may be distinguished by its pubescence, its smaller, thicker leaves with petioles shorter than the blades and by its curved scapes.

Lycopus communis Bickn.

Near Port Jefferson, Suffolk co., and in the Adirondack region. This is closely related to L. virginicus, with which it has been confused and from which it may be separated by the tuberous base of the stem.

Arisaema pusillum (Pk.) Nash

Fine specimens of this plant, which was formerly considered a variety of A. triphyllum, were found near Highland, Ulster co., in June, by C. J. Elting and contributed by him to the herbarium.

Limnorchis media Rydb.

Swamps and wet places near Jordanville, Herkimer co. July. This and the next species were formerly thought to be forms of Habenaria hyperborea, which they closely resemble. State Museum report 50, 1:126.

Limnorchis huronensis (Nutt.) Rydb.

Wet places and swampy ground about Jordanville. July. Also in Petersburg, Rensselaer co. A much smaller plant than the preceding. L. dilatata linearifolia Rydb. is represented in the herbarium by a specimen collected many years ago by Rev J. A. Paine near Hidden lake, Herkimer county.

Carex crawfordii Fern.

This sedge, which has long been known as C. scoparia var. minor, is common in wet places in the eastern and northern parts of the State. It has been raised to specific rank and given a new name by Mr Fernald.

Botrychium matricariae (Schrank) Spreng.

South Corinth, Saratoga co. August.

Pottia riparia Aust.

Limestone rocks. Near Chilson lake, Essex co. July. Sterile. Mrs A. M. Smith and Mrs C. W. Harris. This is a very small moss and one that is easily overlooked. It is rarely fertile.

Tortula ruralis Ehrh.

Limestone rocks. Green lake near Jamesville, Onondaga co. July. Mrs E. G. Britton. The specimens are without fruit.

Racomitrium heterostichum Brid.

Eagle rock gorge near Chilson lake. June. Mrs Smith and Mrs Harris. This is variety gracilescens, a slender moss, and these specimens are without fruit.

Encalypta rhabdocarpa Schwaegr.

Near Chilson lake. June. In fruiting condition. Mrs Smith and Mrs. Harris.

Hypnum lindbergii Limpt.

Regina swamp and Pyramid lake, near Chilson lake. September. Mrs Smith and Mrs Harris.

Liochlaena lanceolata Nees

Regina swamp near Chilson lake, growing on decaying wood. June. Mrs Smith and Mrs Harris. The specimens are fertile and in fine condition.

Amanita flavoconia Atk.

Woods and thickets. Adirondack mountains. July and August. Closely resembling A. frostiana in size and color but distinguishable by the even margin of the pileus, the floccose edge of the lamellae and the fragile character of the volva, which

easily separates from the slightly bulbous base of the stem and adheres to the soil that surrounds it. Both it and the annulus are of a beautiful, chrome yellow color.

Tricholoma radicatum n. sp.

PLATE 82, FIG. 15–19

Pileus fleshy, firm, umbraculiform or broadly convex, dry, minutely silky fibrillose or obscurely fibrillose squamulose, somewhat shining, pale grayish brown, the center usually darker and often tinged with reddish brown, the margin thin, cuticle separable, flesh white, taste disagreeable; lamellae thin, close, emarginate, adnexed, having a decurrent tooth, white; stem firm, nearly equal, hollow with a small cavity, slightly fibrillose, distinctly radicating, white; spores broadly elliptic, .0002–.00024 of an inch long, .00016–.0002 broad.

Pileus 2–3 inches broad; stem 1.5–4 inches long, 3–5 lines thick. Under coniferous trees. North Elba. September.

This mushroom loses its unpleasant flavor in cooking and is edible. A more full and popular description is given in another part of the report.

Clitocybe inversa (Scop.) Fr.

Pine groves. Near Northville, Fulton co. August. A stout form with a thick stem.

Mycena rugosoides n. sp.

PLATE M, FIG. 17–34

Pileus fleshy but thin, campanulate, usually broadly umbonate, glabrous, hygrophanous, even but striate on the margin when moist, paler and uneven when dry, with close irregular radiating rugae, variable in color; lamellae subdistant, rounded or emarginate next the stem, adnexed, whitish or smoky white; stem long, even, glabrous, hollow, radicating, villose tomentose at the base, white or pallid, often tinged with reddish brown at the base; spores elliptic, .0003 of an inch long, .0002 broad, granular.

Pileus 6–12 lines broad; stem 1.5–3 inches long, .5–1.5 lines thick. Gregarious on much decayed, mossy, prostrate trunks of coniferous trees. North Elba. September.

Three forms occur which are separable by color. One is wholly white, another has the pileus and stem cinereous or grayish

brown and the lamellae white, the third has the pileus blackish brown, the stem pallid or grayish brown and the lamellae smoky white. Reddish stains sometimes occur on any part of the plant. These are possibly due to insect injury. The umbo is often very obtuse or almost flat at the top. This species is separated from M. rugosa by its moist umbonate pileus, its long stem, its straight, not oblique, rooting base and by its habitat. The villosity at the base of the stem is grayish white.

Hygrophorus subrufescens n. sp.

PLATE M, FIG. 1–6

Pileus fleshy, but thin on the margin, convex or nearly plane, dry, minutely floccose squamulose, pale pink or grayish red, flesh whitish, faintly tinged with pink, taste mild; lamellae subdistant, decurrent, whitish; stem rather long, equal or nearly so, flexuous, glabrous, solid, white; spores elliptic, .0003 of an inch long, .0002 broad.

Pileus about 1 inch broad; stem 1.5–3 inches long, 2–4 lines thick. Among fallen leaves in woods. Port Jefferson, Suffolk co. August.

This species belongs to the section Camarophyllus, and is related to H. leporinus, from which it may be separated by its different color, thinner margin of the pileus and glabrous stem.

Hygrophorus peckii Atk.

Woods, pastures and bushy places. July and August. Ithaca. G. F. Atkinson. Gansevoort, Saratoga co., Westport, Essex co. and Piseco, Hamilton co. It is most closely related to H. psittacinus, from which it is separated by its odor and decurrent lamellae.

Lactarius luteolus Pk.

PLATE S3, FIG. 7–11

Among fallen leaves in woods. Port Jefferson. August. A very distinct species, easily known by its mild taste, copious milk, changing from white to brown on exposure to the air, and by the somewhat viscid pubescence of the pileus and stem. Milk flows readily from any part of the plant on the slightest injury, and wounds assume a dark brown color. The plant is edible; and is more fully described in another part of this report.

Russula magnifica n. sp.

PLATE N, FIG. 1–4

Pileus fleshy, firm, convex and umbilicate when young, centrally depressed or infundibuliform when mature, glabrous, viscid when young and moist, even, but the cuticle sometimes rimose squamose in the center, even on the margin, the thin pellicle subseparable, flesh white or whitish, odor and taste alkaline, strong and disagreeable; lamellae narrow, crowded, unequal, adnate or slightly decurrent, whitish with a faint pinkish reflection, becoming reddish brown where bruised and rusty brown when old; stem equal or narrowed downward, solid, becoming spongy or sometimes cavernous within when old, white; spores white, even or nearly so, subglobose, .0003–.0004 of an inch long, .00025–.0003 broad.

Pileus 4–10 inches broad; stem 2–5 inches long, 8–18 lines thick. Among fallen leaves in woods. Port Jefferson. August.

This is the largest species of Russula known to me. It is related to R. delica and R. brevipes, from which its large size, peculiar odor and viscid pileus separate it. Sometimes the surface of the pileus is irregularly spotted with small unequal depressions or cavities. The odor persists in the dried specimens.

Russula earlei n. sp.

PLATE N, FIG. 5–10

Pileus fleshy, firm, hemispheric, becoming broadly convex or nearly plane, sometimes centrally depressed, glabrous, very viscid, the margin even when young but sometimes rimose and uneven when old, stramineous, becoming paler with age, flesh whitish or yellowish, taste mild; lamellae thick, distant, adnate, with a few intermediate short ones near the margin, whitish becoming yellowish; stem short, firm, equal or nearly so, solid, becoming spongy within, white; spores white, subglobose, .0002–.00024 of an inch broad.

Pileus 1.5–2.5 inches broad; stem 1–1.5 inches long, 3–5 lines thick. Among fallen leaves in woods. Port Jefferson. August. The spores of this species are unusually small for the genus. This character, with the pale glutinous pileus and distant lamellae, marks the species as very distinct. I take pleasure in dedicating it to its discoverer, Professor F. S. Earle.

Marasmius biformis n. sp.

Pileus thin, submembranaceous, campanulate or nearly plane, generally umbilicate, glabrous, bay red or pale chestnut color and striatulate when moist, paler or grayish and rugosely striate when dry; lamellae rather close, adnate and joined together at the stem, grayish tinged with creamy yellow; stem slender, stuffed or minutely hollow, covered with a dense, downy pubescence, which is brown when moist, cinereous when dry, sometimes slightly tawny toward the base.

Pileus 4–8 lines broad; stem about 1 inch long, .5 of a line thick. Gregarious in groves of coniferous trees. Sandlake, Rensselaer co. August.

The species is closely related to M. subnudus, but the plant is much smaller, the pileus is usually umbilicate and the stem not inserted. The mycelium binds together a mass of dirt and needles which adhere to the base of the stem when the plant is taken from the ground. In some groups nearly all the pilei are campanulate, in others they are nearly plane. This feature is suggestive of the specific name.

Marasmius tomentosipes Pk.

Much decayed, mossy, prostrate trunks of trees. North Elba. September. Similar in color to Omphalia campanella, but differing in its more scattered mode of growth, its longer straight stem sprinkled with tawny mealy particles or covered with tawny tomentum and in its less distinctly umbilicate pileus. In our specimens the stem is flocculent mealy at the top, has scattered flocculent particles below and a copious tomentum at the base, all of a tawny color. The specimens revive under the influence of moisture as in the genus Marasmius, and for this reason they have been referred to this genus. The species was founded on specimens collected in Idaho.

Marasmius leptopus n. sp.

Pileus thin, broadly convex or nearly plane, glabrous, obscurely and rugosely striate on the margin, reddish brown; lamellae thin, narrow, close, adnate, white; stem slender, glabrous, hollow, inserted, whitish or pallid; spores oblong or narrowly elliptic, .0003–.00035 of an inch long, .00012–.00015 broad.

Pileus 3–5 lines broad; stem 1–1.5 inches long, about .5 of a line thick. Fallen leaves. Botanical garden, Bronx park. August.

Marasmius insititius Fr.

Fallen oak leaves. Port Jefferson. August.

Marasmius thujinus n. sp.

Pileus membranaceous, hemispheric or convex, often slightly umbilicate, subglabrous, distantly striate on the margin, cinereous tinged with lilac; lamellae few, distant, adnate, white; stem capillary, hollow, inserted, glabrous or with a few minute, scattered flocci toward the base, pallid, sometimes slightly brownish toward the base.

Pileus 1–1.5 lines broad; stem 6–12 lines long, scarcely thicker than a hair. Fallen leaves of arbor vitae, Thuja occidentalis. North Elba. September.

Under a strong lens the pileus is seen to be minutely pulverulent tomentose, and the stem adorned with a few minute, scattered flocci.

Leptonia hortensis n. sp.

Pileus thin, convex, umbilicate, hygrophanous, reddish brown and striatulate when moist, paler and silky when dry; lamellae thin, close, adnexed, whitish when young, pinkish when mature; stem short, thin, glabrous, hollow, colored like the pileus; spores angular, uninucleate, .0003–.0004 of an inch long, .0003 broad.

Pileus 5–10 lines broad; stem 8–12 lines long, about 1 line thick. Naked ground in gardens. Menands, Albany co. July.

Flammula pusilla n. sp.

PLATE M, FIG. 35–41

Pileus thin, convex becoming nearly plane, glabrous, viscid, pale buff or yellow ferruginous; lamellae narrow, close, adnate, whitish when young, brownish ferruginous when mature; stem short, equal, solid or stuffed, floccose fibrillose, whitish becoming ferruginous toward the base, which is slightly villose strigose, flocculent pulverulent at the top; spores elliptic, .0003 of an inch long, .00016 broad.

Pileus 6–12 lines broad; stem 8–15 lines long, about 1 line thick. Roots of stumps and water-soaked wood in open places. Smithtown, Suffolk co. August.

This species resembles small forms of Naucoria semiorbicularis in shape and color, but its more viscid pileus, adnate lamellae, solid or merely stuffed stem and peculiar habitat distinguish it. In very young plants a slight whitish veil is perceptible.

Craterellus subundulatus Pk.

Pileus thin, firm, subinfundibuliform, slightly floccose squamulose or fibrillose, grayish or grayish brown, wavy or lobed on the margin, the lobes often overlapping; hymenium slightly radiately rugose, creamy white; stem short, firm, solid, colored like the pileus; spores elliptic, .0003 of an inch long, .00016 broad.

Pileus 4–8 lines broad; stem 5–10 lines long, 1–1.5 thick. Gregarious or cespitose. Under beech trees. New York Botanical garden. August.

Closely related to C. sinuosus, from which it differs in its smaller size, solid, darker colored stem and slightly smaller spores. Formerly referred to the genus Thelephora.

Clavaria crassipes n. sp.

Stem thick, firm, solid or sometimes with a cavity at the base, glabrous white or whitish, repeatedly branched above, the branches very numerous, crowded, solid, terminating in obtuse or obtusely dentate tips, whitish or slightly yellowish; spores oblong, uninucleate, .0006–.0007 of an inch long, .00025–.0003 broad, with an oblique apiculus at the base.

Plant 3–6 inches high, 2–4 inches broad in the widest part, with the short stem about 1 inch thick. In woods and groves. Sandlake. August.

The flesh of the stem when cut or broken slowly assumes a smoky brown color.

Clavaria tsugina n. sp.

Stem very short, glabrous, branching from the base, solid, the branches few or many, suberect, sometimes crowded, flexible, rather tough, solid, terminating in acute tips, young plants and growing tips creamy yellow, older parts and mature plants

vinaceous cinnamon or reddish brown, spores orchraceous, elliptic, .0003 of an inch long, .00016 broad.

Plants 1–3 inches high, nearly as broad in the widest part. Prostrate, decaying trunks of hemlock, Tsuga canadensis. Adirondack mountains. July and August. Closely allied to C. abietina, from which it differs in its naked stem, in having no bitter flavor and in wounds not assuming a green color.

Secotium warnei Pk.

Near Gouverneur, St Lawrence co. October. Mrs E. C. Anthony. This is the most eastern station known to me for this western species. It has been thought by some mycologists to be the same as S. acuminatum, but it appears to me to differ constantly from the description of that species in shape and color. It is very variable in shape and is sometimes umbonate, but I have never seen any specimens that could properly be called acuminate, nor any having an ochraceous or alutaceous color. It does not seem to be wise to give up a certainty for an uncertainty and to throw together forms which are constantly diverse.

Tylostoma poculatum White

Sandy soil. Karner, Albany co. Our specimens are a little smaller than the typical form, which was collected in Nebraska.

Tylostoma punctatum Pk.

Sandy soil. West Albany. May. Formerly confused with T. fimbriatum, from which it may be distinguished by the punctate inner peridium.

Licea variabilis Schrad.

Decaying wood of spruce. Oldforge, Herkimer co. August. Very variable in form. Sometimes the spores adhere to each other in groups.

Aecidium ligustri Strauss

Living leaves of privet, Ligustrum vulgare. Menands. June. Altamont. F. J. H. Merrill.

Cintractia affinis n. sp.

Stroma continuous, usually surrounding the stem of the host plant and forming patches 6–24 lines long, at first covered by a

white crust, which at length ruptures and disappears, exposing the surface of a jet black, firm, but slightly pulverulent spore mass; spores globose or subglobose, minutely and closely papillose, involved in a thin, obscure, hyaline, gelatinous coat, black, .0006–.0008 of an inch broad.

Living stems of Rhynchospora macrostachya Torr. Smithtown, Suffolk co. August.

This interesting species is closely related to C. leucoderma, from which it differs in its longer, thinner and more intensely black spore mass, which occupies the stem instead of the sheaths and flower spikes, and by its more globose spores, which are minutely and closely but not spirally papillose. Two spore masses usually develop on one stem. These are commonly separated by a slight interval. Occasionally the lower is free from the white crust, while the upper still retains it. The thickness of the spore mass, including the inclosed stem, is usually 1–1.5 lines.

Phyllosticta grisea n. sp.

Spots suborbicular, small, 1–1.5 lines broad, arid, gray with a purplish brown margin, brown beneath, occasionally brown above; perithecia epiphyllous, minute, erumpent, black; spores elliptic, hyaline, .00025–.0003 of an inch long, .00016 broad.

Living leaves of Crataegus praecox. Crown Point. September.

Gloeosporium phaeosorum Sacc.

Dead canes of blackberry. Farmer, Seneca co. May. F. C. Stewart.

Sporotrichum poae n. sp.

Hyphae slender, .00008–.00012 of an inch thick, procumbent, branched, slightly interwoven, white; spores colorless, subglobose, .00016–.00032 of an inch broad.

Sheaths and culms of Kentucky blue grass, Poa pratensis. Geneva. June. F. C. Stewart. The fungus occurs both without and within the sheaths of culms that have died, but whether their death was due to the attack of the fungus or of insects is not clear.

Penicillium digitatum (Fr.) Sacc.

Decaying lemons. Albany. Sometimes the whole surface of the lemon is covered with a dusty, bluish green coat of this mold.

Penicillium pallidofulvum n. sp.

Sterile hyphae creeping, forming a stratum of dense, tawny tomentum; fertile hyphae erect, septate, simple or with one to three short branches or protuberances at the top; spores catenulate, elliptic, .00012–.00016 of an inch long, at first white, soon pale tawny or ochraceous.

Parasitic on Lactarius deceptivus. Round Lake. July.

Macrosporium lagenariae Thum.

On fruit of gourds, Lagenaria vulgaris. Albany. January. W. L. Smith.

Fusarium laxum n. sp.

Tufts minute, loosely gregarious, white; sporophores slender; spores narrowly fusiform, slightly curved, 3–5 septate, hyaline, .001–.002 of an inch long.

Dead stems of scouring rush, Equisetum hiemale. Delmar. July. Apparently a peculiar species belonging to the section Fusisporium but having tufted sporophores.

Stilbum resinaria n. sp.

Stem cylindric, about .25 of a line long, white; capitulum globose or depressed globose, creamy yellow; spores minute, subglobose, .00008–.00012 of an inch long, nearly as broad.

Resinous spots on bark of balsam fir, Abies balsamea. Adirondack mountains. Closely allied to S. rehmianum.

Helvella ambigua Karst.

Decaying wood. Piseco. August. G. F. Atkinson. This species may easily be confused with H. infula, from which it scarcely differs except in its pileus having a reticulated surface and in its longer, more fusiform spores.

Detonia fulgens (Pers.) Rehm

Under spruce and balsam fir trees. North Elba. May. Near Ithaca. April. E. J. Durand.

Geopyxis carbonaria A. & S.

Burnt soil. Ithaca. May. Specimens of this and the nine following species were contributed by Mr Durand.

Calloria caulophylli (E. & E.) Rehm

Dead stems of blue cohosh, Caulophyllum thalictroides. Ithaca. May.

Lachnum inquilinum (Karst.) Schroet.

Dead stems of scouring rush, Equisetum hiemale. Ithaca. May.

Sclerotinia smilacinae Durand

Dead rootstocks of wild spikenard, Smilacina racemosa. Ithaca. May.

Ciboria americana Durand

Dead chestnut burs. Ithaca. October.

Ciboria sulphurella (E. & E.) Rehm

Dead petioles of ash leaves. Farmington, Ontario co. September.

Peziza violacea Pers.

Burnt soil. Ithaca. May.

Caldesia sabinae (Dellot) Rehm

Loose bark of red cedar, Juniperus virginiana. Ithaca. November.

Helotium scutula vitellinum Rehm

Dead stems of herbs. Ithaca. October.

Ascobolus atrofuscus Ph. & Pl.

Charred wood. Canandaigua. September.

Melanospora vervecina (Desm.) Fckl.

Decaying wood of yellow birch, Betula lutea. North Elba. September.

Leptosphaeria variegata n. sp.

Perithecia numerous, minute, depressed globose, seated on indeterminate spots of a pinkish, grayish or brownish color, at first covered by the epidermis, then erumpent, black; asci cylindric;

spores oblong or subfusiform, triseptate, colored, .00[illegible]–.0008 of an inch long, .00016–.0001S broad.

Dead stems of pokeweed. Phytolacca decandra. Near Trenton Falls. September.

D

REMARKS AND OBSERVATIONS

Lepidium virginicum L.

A dwarf form, 4 to 8 inches high and without branches, or nearly so, was found growing in sandy soil near Delmar. A similar form of L. apetalum Willd. was found growing from a thin coating of vegetable mold covering flat surfaces of outcropping rocks near Westport. This was in flower in May, the other in July.

Lepidium ruderale L.

Fine specimens of this species were found by the roadside near Lansingburg. May and June.

Raphanus raphanistrum L.

A form with flowers of a peculiar brownish buff color, changing to reddish brown with age, was found growing in sandy soil near Karner. It was associated with the ordinary form and with the cultivated radish, R. sativus.

Viola papilionacea domestica (Bickn.) Poll.

Waste places about Port Jefferson. August. In fruit from cleistogamous flowers.

Drosera rotundifolia L.

A form of the round leaved sundew occurs near Port Jefferson, in which the scape divides above, forming two flowering branches with a flower in the axil.

Rubus occidentalis pallidus Bail.

Near Albia, Rensselaer co. In fruit in July. This differs from the common form of the species in having pale yellowish fruit.

Kneiffia pumila (L.) Spach

A much branched form, with branches straight and erect, or nearly so, and flowering abundantly, was found near North Albany in July.

Myriophyllum humile (Raf.) Morong

Muddy shore of a small pond near Smithtown, Suffolk co. August. A small, rare and pretty little plant.

Erigeron ramosus (Walt.) B. S. P.

The variety discoideus has been unusually plentiful about Albany the past season. The peculiarly cool, wet season was probably favorable to it.

Galinsoga parviflora hispida DC.

This introduced plant is reported by Mrs M. A. B. Kelly to be acting like a pestilent weed in a garden at Gloversville.

Antennaria neglecta simplex n. var.

Stems 7–9 inches long, heads of flowers single or occasionally two, very rarely three; involucral bracts oblong or linear, acute or the outer obtusish, brownish with white tips. Sandlake. May.

These plants grew in a patch about 6 feet in diameter. They have a peculiar appearance by reason of the single heads.

Helianthus giganteus L.

Roadsides. Keene, Essex co. September. A rare plant in this part of the State.

Polymnia canadensis radiata Gray

Near Syracuse. June. Miss M. L. Overacker.

Xanthium canadense L.

A dwarf form of this species, 6–10 inches high, is plentiful on sandy and gravelly shores of Lake Champlain at Crown Point. The burs sometimes have but one beak, and the prickles are strongly curved.

Verbena hastata L.

A plant having a close resemblance to this species was collected at Trenton Falls. Its spikes are less dense, and its flowers are pink. It is probably a hybrid of V. hastata and V. urticifolia.

Origanum vulgare L.

A white flowered form occurs at Trenton Falls.

Tetragonanthus deflexus (Sm.) Kuntze

This is Halenia deflexa of the *Manual* and is a rare plant in our State. It was found many years ago near Trenton Falls by Dr J. V. Haberer. In company with him, I visited the locality in August last and found the plant still there but in small quantity. A specimen in the herbarium represents another locality for it in Sullivan county. In *New York State Flora* Dr Torrey credits it to margins of lakes in the northern part of the State on the authority of Dr Hadley. It is desirable that any one finding it within our State should guard as far as possible against its extermination.

Physalis heterophylla ambigua (Gray) Rydb.

Sandy soil. Karner, Albany co. June and July. In our specimens the anthers and their short, thick filaments are purple when young. The greenish yellow corolla has the brown central spot lobed, and from the lobes brown lines radiate, giving the spot a fringed appearance. The lower leaves are often orbicular.

Polygonum convolvulus L.

A form having a short, erect, sparingly branched stem occurs in sandy soil about Karner. It corresponds to variety breve of P. cilinode.

Lilium canadense L.

The Canada lily was found growing in great abundance in a low, wet meadow near Mount Kisco, Westchester co., by W. P. Judson. The plants were small, the stems short and slender, each bearing, in most cases, a single small flower, and the leaves were smaller than usual. In an adjoining meadow on higher and drier ground the usual form of the species was plentiful. The two forms afford a good illustration of the influence of soil and moisture on plant development. The cold, wet soil of the low meadow was evidently unfavorable to the proper development of this lily, and suggests the importance of a well drained soil for plants that do not like cold, wet feet.

Scirpus sylvaticus bissellii Fern.

Low ground. West Albany. Several years ago a single specimen of this variety, was collected by the late Rev. J. H. Wibbee and presented to the herbarium. The station has since been destroyed, and I know of no other in the State where this variety has been found.

Sporobolus longifolius (Torr.) Wood

Rocky sides of Skenes mountain, Whitehall. September. It was associated with Sporobolus neglectus and Aster concinnus. Quercus acuminata (Mx.), the eastern form of which is Q. alexanderi Britton, was growing near it. This mountain is an interesting botanical station.

Buxbaumia indusiata Brid.

Near Rochester. October. M. S. Baxter. This is the fourth and most western station for this rare moss in our State. It has been found in the Catskill mountains and in two places, Horseshoe pond and Lake Placid, in the Adirondack mountains.

Amanitopsis volvata (Pk.) Sacc.

An unusual form of this species was found in the wooded grounds of the New York botanical garden. A part of the volva was closely adherent to the center of the pileus, as in Amanita calyptrata, and the base of the stem was more closely sheathed than usual by the remains of the volva.

Amanitopsis strangulata Fr.

Piseco and North Elba. August and September. This northern form differs from the more southern one in having the pileus adorned with unequal fragments of the ruptured volva instead of nearly equal, wartlike remnants.

Clitocybe dealbata deformata n. var.

Pileus thin, very irregular, convex or centrally depressed, wavy or lobed on the margin, the upper surface sometimes partly transformed into a hymenium consisting of daedaloid pores in the center and branching and anastomosing lamellae toward the margin, snowy white where free from hymenial development,

flesh pure white, taste farinaceous; lamellae close, adnate or slightly decurrent, transversely venose, often anastomosing or connected by veins, frequently eroded on the edge and sometimes transversely split, whitish; stem irregular, sometimes compressed, more or less confluent at the base, stuffed or hollow, white, with a soft, pure white, downy tomentum below; spores subglobose .00012–.00016 of an inch long, nearly as broad.

On mushroom beds in a greenhouse. Newark, Wayne co. March. C. E. Clark and B. C. Williams. The specimens grew in mushroom beds made in a poorly lighted apartment, in which a temperature of 55°–60° was maintained. These conditions doubtless had some influence in causing the irregular, tufted mode of growth. In their pure whiteness and in the tendency of the gills to anastomose these mushrooms resemble Clitocybe similis, but the thin pileus and the farinaceous taste and odor indicate a relationship with C. dealbata so intimate that it is recorded as a variety of it. That species is also sometimes found growing in mushroom beds.

Clitocybe multiceps Pk.

A singular form of this species was found growing under a flagstone in Newark by Mr B. C. Williams. In the effort to expand the pileus in the open air, the stem was greatly elongated. In one specimen the stem was 13 inches long, in the other, 16.

Clitocybe tortilis gracilis n. var.

Pileus thin, convex and slightly umbilicate, becoming centrally depressed or infundibuliform with age, irregular, striate on the margin and reddish flesh color when moist, paler when dry; lamellae broad, distant, adnate or decurrent, pruinose when old and dry; stem slender, firm, glabrous, hollow but the cavity small.

Pileus 3–6 lines broad; stem 6–10 lines long, about .5 of a line thick. Gregarious on moist, shaded ground. New York Botanical garden. August. F. S. Earle.

This differs from the typical form of the species in its more slender stem, more distant lamellae and more funnel-form pileus.

Collybia uniformis Pk.

PLATE M, FIG. 7-16

Specimens larger than the typical form were found in North Elba, growing on decaying wood of balsam fir, Abies balsamea. After the moisture has escaped from the pileus, it has a pruinose appearance, which is due to a minute, whitish pubescence. The stem is sometimes compressed. In its general characters and tufted mode of growth it is closely allied to C. familia.

Lactarius subdulcis oculatus n. var.

PLATE 83, FIG. 20-24

Pileus moist, subhygrophanous, vinaceous buff with a small central spot or umbo persistently reddish brown or chestnut color. Otherwise like the species. Under spruce and balsam fir trees. North Elba. September.

Hygrophorus capreolarius Kalchb.

This beautiful species inhabits groves of spruce and balsam fir in North Elba, but I have seen it in no other part of the State. It is gregarious or cespitose, has an attractive appearance and an agreeable flavor when fresh, but when fried in butter it develops a bitter taste which makes it objectionable as an edible mushroom.

Russula olivascens Fr.

Port Jefferson. August. European authors in their descriptions of this species do not mention the color of the spores. In our plant they are ochraceous.

Russula granulata lepiotoides Atk. in litt.

This variety differs from the typical form in its pileus, whose upper surface soon becomes rimose squamose. It was common, in August, in the woods about Piseco, Hamilton county.

Cantharellus cibarius albipes n. var.

This differs from the usual form of the species in having the stem white.

Stropharia siccipes radicata n. var.

Differs from the species in having a long, radicating base to the stem. This probably depends on and is due to the fact that it

grows from manure buried in the earth. New York Botanical garden. June. F. S. Earle. Menands. July.

Marasmius resinosus niveus n. var.

Whole plant pure white. In other respects like the species. Port Jefferson. August.

Hypholoma sublateritium squamosum Cke.

Differs from the typical form in having the pileus spotted with brownish, fibrillose scales. In the dried specimens these scales are less distinct. Piseco. August.

Hypholoma subaquilum Banning

Decaying, prostrate trunks of trees in woods. Piseco. August. This species sometimes occurs in great abundance. The margin of the pileus is often adorned with whitish, floccose fibrils of the veil, which in the young plant may be interwoven and form a delicate membrane which conceals the lamellae. As the pileus expands, this separates from the stem and adheres to the margin of the pileus, curving under and still hiding the outer extremities of the lamellae. In the mature plant, however, all vestiges of the veil have generally disappeared. This species is most closely allied to H. appendiculatum, scarcely differing from it except in the darker color of the young lamellae and the smaller spores. Like that species it is hygrophanous, becoming paler and rugose in drying.

Coprinus micaceus Fr.

Specimens of the glistening coprinus were found growing from a stratum of its coarse, felty ozonium or mycelium, which had overspread a part of the surface of an old, prostrate tree trunk in woods near Piseco. August.

Merulius tenuis Pk.

Much decayed wood. Piseco. The type specimens of this species were collected near Ithaca by Professor W. R. Dudley. Fine specimens of it were collected at Piseco by Professor G. F. Atkinson. It is a rare species.

Odontia lateritia B. & C.

On a decorticated, prostrate pine trunk in woods. North Elba. September. The specimens on pine are thinner than those on oak, and, where the surface of the wood is smooth, the fungus is to some extent separable from it. The species is doubtless the same as Phlebia hydnoidea Schw. and should take the name Odontia hydnoidea (Schw.).

Nidularia pulvinata (Schw.) Fr.

Fine specimens were found in North Elba, growing on decorticated wood of spruce. This fungus was first described by Schweinitz under the name Cyathus pulvinatus. Fries changed the name to Nidularia pulvinata, and recently the species has been transferred to another genus, and it stands as Granularia pulvinata (Schw.) White.

E

EDIBLE FUNGI

Tricholoma subacutum Pk.

SUBACUTE TRICHOLOMA

PLATE 82, FIG. 7–14

Pileus ovate or subcampanulate, becoming broadly convex or nearly plane, usually prominently and acutely umbonate, dry, silky fibrillose or virgate with innate brown or blackish fibrils, cinereous, grayish brown or blackish brown, the umbo commonly darker, sometimes black; lamellae rather close, rounded behind, adnexed, white; stem rather long, equal, solid, silky fibrillose, white; spores broadly elliptic or subglobose, .00025–.0003 of an inch long, .0002–.00025 broad.

The subacute tricholoma is easily recognized by its prominent pointed umbo, by the minute, radiating, brown or blackish lines or fibrils on its dry cap and by the white color of its flesh and stem. It is not abundant, and has been found by me in North Elba only. It grows in woods and in groves of young spruce and balsam fir trees, appearing in September. The cap varies in color, being pale gray, grayish brown or blackish brown. The umbo is frequently darker than the rest, and in dark colored

specimens it is nearly or quite black. The cuticle is separable from the white flesh beneath. The flesh has no decided odor, and its taste is sometimes acrid and sometimes mild. The gills are rather broad but close, rounded behind and slightly attached to the stem. They are white, but are apt to become dingy or brownish in drying. The stem is rather long, equal, smooth or slightly fibrillose, solid, or hollow from the erosion of insect larvae and white.

The cap is 1.5–3 inches broad; the stem 2–4 inches long, 3–6 lines thick. The species is so closely related to the European virgate tricholoma, Tricholoma virgatum, that it is with some hesitation that I have kept it distinct. In the virgate tricholoma the taste is described as bitter, intensely bitter or bitter in the young plant and more mild in the mature one, the umbo is represented as low, broad and blunt and the cuticle on it as breaking up and forming scales. The stem is described and figured as more or less bulbous. These characters are not found in our plant, and their absence seems to justify its separation.

Tricholoma radicatum Pk.

ROOTED TRICHOLOMA

PLATE 82, FIG. 15–19

Pileus fleshy, deeply or broadly convex, dry, silky fibrillose or minutely squamulose, grayish brown, the center darker and often tinged with reddish brown, flesh white, taste disagreeable; lamellae thin, close, emarginate, adnexed, white; stem equal or nearly so, radicating, hollow, white; spores broadly elliptic or subglobose, .0002–.00024 of an inch long, .00016–.0002 broad.

The rooted tricholoma is a rare species with us. It occurs under spruce, balsam fir and other cone bearing trees in North Elba, and is solitary or scattered in its mode of growth. It was found in September and is apparently an autumnal species. Its cap is broadly convex when mature, but in immature plants it is similar in shape to an open umbrella. It is firm but flexible, and its cuticle is separable from the white flesh. The surface is dry, minutely silky and sometimes roughened with minute scales. Its color is gray or grayish brown, generally a little darker in the center, where it is tinged with reddish brown. The flesh is

white, but its taste is unpleasant. The gills are closely placed, wide in the middle, excavated at the stem end, where there is a slight prolongation running down on the stem and giving its top a striated appearance. Their color is white and unchangeable. The stem is smooth or slightly fibrillose, hollow but with a small cavity and white. There is a rootlike prolongation at the base, which tapers downward and penetrates the earth.

The cap is 2–3 inches broad; the stem 1.5–4 inches long, 3–5 lines thick. The unpleasant flavor is lost in cooking.

Tricholoma silvaticum Pk.

WOOD TRICHOLOMA

PLATE 82, FIG. 1-6

Pileus convex or nearly plane, dry, glabrous, subumbonate, whitish; lamellae broad, ventricose, subdistant, adnexed, white; stem equal or nearly so, glabrous, solid, white; spores elliptic .00045–.0005 of an inch long, .00025–.0003 broad.

The silvan tricholoma is a small, well formed mushroom, growing among mosses or fallen leaves in woods. Its cap is convex or nearly plane with decurved margin. It is generally crowned with a broad, slightly elevated umbo, and is smooth, dry and whitish. The flesh is thin and white, the taste farinaceous. The gills are broad with broad interspaces. They are deeply notched next the stem and white. The stem is equal in diameter in all its parts or sometimes slightly tapering upward. It is smooth or obscurely fibrillose, slightly mealy or pruinose at the top, solid, firm and white.

The cap is 1–1.5 inches broad; the stem 1–2 inches long, 2–4 lines thick. This species has been found by me in North Elba only. It occurs in September. It may be separated from the white cap tricholoma, T. leucocephalum, and from the disagreeable tricholoma, T. inamoenum, by the absence of any distinct odor and by the color of its cap, which is not pure white, as in these species but a creamy white or pale buff.

Hygrophorus pudorinus Fr.

BLUSHING HYGROPHORUS

PLATE 83, FIG. 1-6

Pileus fleshy, firm, convex becoming nearly plane, glabrous, viscid when moist, pinkish buff, flesh white, taste mild; lamellae

distant, adnate becoming decurrent, white; stem stout, solid, equal, white, roughened with white points at the top; spores white, elliptic, .0003–.0004 of an inch long, .00016–.00024 broad.

The blushing hygrophorus is a large and beautiful species, clean and attractive and a fine addition to our list of edible mushrooms. It is gregarious or tufted in its mode of growth and grows most frequently but not always under spruce and balsam fir trees, or where these trees have previously grown. It appears late in the season. Our plant differs in some minor features from the description of the European plant, but in essential characters the agreement is so close that there can be little doubt of its identity. Its fleshy, firm cap is convex or broadly conic when young, with the margin involute and often downy and studded with drops of moisture, though the margin in the European plant is described as naked. When mature it is broadly convex or nearly plane, but sometimes has a broad but slight central elevation or umbo. It is very smooth, viscid when moist and of a beautiful, delicate pinkish buff color, sometimes slightly tinged with brown or reddish brown in the center. The flesh is white, slightly tinted under the thin, separable pellicle with the color of the cap. The flavor is mild, and it has no very distinct odor. The gills are at first attached to the stem by the entire width of the inner extremity, but, when the cap is fully expanded, they are somewhat decurrent. They are rather wide apart, white and sometimes have a slight salmon-colored reflection. The stem is stout, nearly equal in diameter throughout but sometimes abruptly pointed at the base, solid, white and roughened with white points at the top. These points or dots are apt to become reddish in drying and they sometimes extend nearly to the base of the stem. The stem of the European plant is described as constricted at the top, but figures of it by European mycologists do not show this character, from which I conclude that it is not constant.

The cap is 2–4 inches broad; the stem is 2–5 inches long, 6–10 lines thick. Fried in butter, it has an agreeable flavor and may easily be placed among the first class mushrooms.

Lactarius luteolus Pk.

YELLOWISH LACTARIUS

PLATE 83, FIG. 7-11

Pileus fleshy, firm, convex or nearly plane, sometimes umbilicately depressed in the center, pruinose, more or less rugose, yellowish or buff color, flesh white, becoming brown where wounded, taste mild, milk copious, white or whitish, changing to brown; lamellae close, adnate or slightly rounded behind, whitish, becoming brown where wounded; stem short, equal or tapering downward, firm, solid or somewhat spongy within, white or buff color; spores white, globose, .0003 of an inch broad.

The yellowish lactarius is a very distinct species, easily known by its buff color, copious white milk, changing to brown on exposure to the air, and by its minutely velvety cap, which to the naked eye has a pruinose appearance. The cap is broadly convex or nearly flat when mature, sometimes with a slight central depression. Its surface is seen by the aid of a lens to be covered with a minute velvety pubescence, which is soft to the touch and when moist is slightly sticky. The surface is sometimes even but more often rugose. Occasionally there is a narrow encircling furrow or band near the margin. The color is whitish, buff or yellow buff, becoming more pronounced in drying. The flesh is white or whitish. Wounds of any part of the plant assume a brown color. The gills are narrow, closely placed, attached to the stem but scarcely decurrent on it, whitish. The stem is short, cylindric or rarely tapering downward, solid or somewhat spongy in the center and colored like the cap.

The cap is 1.5–3 inches broad; the stem is 1–1.5 inches long, 3–5 lines thick. The plant grows in a scattered manner among fallen leaves in woods and appears in August. Lactarius foetidus, the fetid lactarius, is closely related and may yet prove to be a mere variety having a strong disagreeable odor and less copious milk.

Lactarius subdulcis (Bull.) Fr.

SWEET LACTARIUS

PLATE 83, FIG. 12-24

Pileus thin, broadly convex becoming nearly plane or centrally depressed, usually with a small papillalike umbo, even, glabrous,

zoneless, tawny red, bay red or cinnamon red, flesh whitish, often tinged with red, taste slightly or tardily acrid, milk white, unchangeable; lamellae thin, close, adnate or slightly decurrent, whitish, pallid or rufescent; stem short, equal or tapering upward, stuffed or hollow, glabrous, colored like or a little paler than the pileus; spores white, globose, .0003–.00035 of an inch broad.

The sweet lactarius is one of our most common species. It is rather small, but it often grows in sufficient abundance to compensate for its deficiency in size. It is gregarious in its mode of growth and occurs in a great variety of soil and location. It may be found in woods and in open places, on naked soil or among fallen leaves or growing from decaying wood or among living mosses. In dry weather, when it can no longer be found in exposed dry places, it still persists in swamps, sphagnous marshes and wet, shaded places. It appears from June to October.

Its cap is generally broadly convex or nearly plane, but sometimes by the elevation of the margin it becomes centrally depressed or almost funnel-form. Usually there is a small prominence or umbo in the center, but often this is entirely absent. The surface is quite smooth and sometimes moist and shining. Its color varies from light red or yellowish red to bay red. The margin is sometimes wavy or lobed. The gills are thin, narrow, closely placed and vary in color from whitish to rufescent, resembling the cap in color. The stem may be short or long according to its place of growth. When growing among mosses, it is apt to be longer than on bare ground. Sometimes there is a coarse villosity or hairiness at the base of the stem, otherwise it is smooth. It is generally hollow and brittle. In color it is similar to or a little paler than the cap. The white milk does not change color, and the taste varies somewhat, being in some cases almost mild, in others tardily but decidedly acrid.

The cap is usually 1–2 inches broad; the stem 1–2.5 inches long, 1–3 lines thick. The acrid taste is lost in cooking, and when fried in butter it may be regarded as a fairly good though not highly flavored mushroom. Several varieties of this variable species have been described, but a well marked one, of which I

find no description, was discovered in North Elba, and is described in another place in this report, under the name Lactarius subdulcis oculatus. The varietal name is suggested by the dark colored umbo or eyelike spot in the center of the cap.

Russula crustosa Pk.

CRUSTED RUSSULA

PLATE 81, FIG. 1–7

Pileus fleshy, firm, very convex becoming nearly plane or centrally depressed, slightly viscid when moist, even or striate and rimose areolate on the margin, commonly even in the center, flesh white, taste mild or sometimes tardily acrid; lamellae moderately close, narrowed behind, some of them forked, white; stem short, stout, equal, stuffed or hollow, white; spores white, subglobose or broadly elliptic, .0003–.0004 of an inch long, .00025–.0003 broad.

The crusted russula is closely related to the greenish russula, R. virescens, and the cracked russula, R. cutefracta. From the former it differs in its slightly viscid cap of which the cuticle cracks and forms small, crustlike patches or scales on the margin but usually remains entire in the center; from the latter it is distinct by the absence of any red or purplish tints in the flesh and the stem. Even in purplish specimens the flesh and stem are wholly white.

The cap is very convex or almost hemispheric when young, nearly plane or centrally depressed when mature. The surface cracks toward the margin as in R. cutefracta, while the center nearly always remains entire. These surface chinks form small areolae or scales which appear like fragments of a crustaceous cuticle.

The color varies greatly. It may be straw yellow, pale ochraceous, brownish ochraceous, greenish with a yellowish or pale ochraceous center or a dull brownish purple. The center is sometimes paler, sometimes darker than the margin. The flesh is white, and the taste mild or sometimes slightly and tardily acrid. The acridity if present is destroyed by cooking. The gills are white, narrowed toward the stem and nearly free. They are sometimes forked, specially near the stem, and intervening

short ones occur near the margin. They are white and unchangeable. The stem also is white. This mushroom is more common with us than the greenish russula, which it resembles in size and flavor. It grows in woods and open ground and appears in July and August.

Cantharellus dichotomus Pk.

DICHOTOMOUS CHANTARELLE

PLATE 84, FIG. 8–21

Pileus fleshy, soft and flexible, subconic when young, with the margin involute and downy or flocculent, convex, nearly plane or centrally depressed when mature, even or with a small pointed umbo, dry, glabrous, variable in color, flesh white, taste mild; lamellae narrow, close, dichotomous, decurrent, white or yellowish; stem equal or tapering upward, solid, glabrous or slightly fibrillose; spores narrowly elliptic, .0003–.0004 of an inch long, .00016 broad.

The dichotomous chantarelle is a small but common species in our hilly and mountainous districts. It grows in woods among mosses or in pastures and bushy places among grasses and fallen leaves. The cap is generally broadly convex with decurved margin, but sometimes it becomes centrally depressed by the elevation of the margin. The umbo is small and usually acute, or papillalike, but it is often entirely absent. The margin is involute and minutely flocculent or downy when young, but it soon becomes naked. The surface is smooth or obscurely silky and occasionally becomes minutely rimose areolate. The color is very variable and may be grayish white, grayish brown, yellowish brown, blackish brown or bluish gray. The flesh is white or whitish, and the taste mild. The gills are narrow, thin, close, decurrent and 1–3 times forked. They are white or whitish, sometimes tinged with yellow. In moist weather wounds of them and also of the stem sometimes become reddish. The stem is equal in diameter or slightly tapering upward. It is glabrous or slightly fibrillose, solid, whitish or pallid or colored like the pileus, and when growing among mosses is clothed below with a soft, dense, white tomentum, which binds it so closely to the mosses that it is difficult to take a specimen without breaking the stem unless the mosses are taken with it.

The cap is 6–18 lines broad, the stem is 1–3 inches long, 2–4 lines thick. It is gregarious and appears from July to September. As an edible mushroom it is not as tender as some nor as highly flavored, but it is satisfactory and enjoyable.

It is related so closely to Cantharellus umbonatus that it has sometimes been regarded as a variety of it or has even been confused with it, but the gills of that species are described as straight, and in our plant they are constantly repeatedly forked as in C. aurantiacus and C. albidus. The umbo in our plant is small and pointed and often wholly wanting, but in C. umbonatus it is represented as broad and blunt. Because of these discrepancies it seems best to keep our plant distinct.

F

PLANTS OF THE SUSQUEHANNA VALLEY AND ADJACENT HILLS OF TIOGA COUNTY

BY FRANK E. FENNO

The territory included in this flora consists of a strip of land about 8 miles wide, lying on both sides of the Susquehanna river and extending nearly east and west through the county. Its surface is broken by the foothills of the Alleghany mountains. These consist of a series of ridges from 1200 to 1500 feet above tide. They are divided diagonally by the valley of the Susquehanna and separated laterally by the valleys of the Apalachin, Wapasening, Owego, Catatonk, Pipe and Cayuta creeks. These creeks have rapid currents. Their valleys are narrow in the upper part, but expand toward the river into broad and level fields.

The Susquehanna winds its way through a tortuous valley bordered on either side by banks, which generally slope gradually to the broad and rolling hilltops. Yet the valley is defined in some places by steep and rocky acclivities which rise from 300 to 400 feet above the surface of the river. These acclivities furnish congenial homes for many rock-loving species of plants. The soil in the valleys is mainly alluvial, lying on a deep drift consisting of sand, gravel and clay. This drift forms the soil of the adjacent hills. The territory contains very little

broken country, and the rock outcrops are all sandstone belonging to the Chemung group. Yet the conditions are such as are favorable to plant life and to a rich and diversified flora. A few plants of the region farther north have been brought down by the mighty torrent of the river, while others have slowly crept up from the ocean, and have found congenial homes in the alluvial soil along the river. The writer's knowledge of this flora has been acquired during his past seven years' residence in Tioga county. He has gone over the entire territory and has collected specimens of nearly every species and variety included in this list.

The *Illustrated Flora* of Britton and Brown has chiefly been followed in nomenclature and in the arrangement of orders. When the names of the species and varieties differ from those in the sixth edition of Gray's *Manual,* the names in the latter are given second place.

Cordial acknowledgment of assistance in the identification of critical species is hereby tendered to Professor F. Lamson Scribner, Edward S. Burgess, Dr John K. Small, Dr Nathaniel L. Britton and specially to Charles H. Peck and the late Dr Thomas C. Porter. They have, by their correspondence extending over several years, aided and encouraged the writer in the study of the plants of this region.

PTERIDOPHYTA

Ferns and fern-allies

OPHIOGLOSSACEAE

Botrychium obliquum Muhl.

B. ternatum var. obliquum D. C. Eaton

Oblique grape fern

On knolls in old clearings and pastures. Frequent. September.

Botrychium dissectum Spreng.

B. ternatum var. dissectum D. C. Eaton

Cut-leaved grape fern

Damp pastures. Barton. Rare. September.

Botrychium virginianum (L.) Sw.

Rattlesnake fern

Rich moist woods. Common. August.

OSMUNDACEAE

Osmunda regalis L.

Royal fern

Swamps and wet woodlands. Frequent. June-July.

Osmunda cinnamomea L.

Cinnamon fern

Low woods, thickets and swamps. Common. May-July.

Osmunda claytoniana L.

Clayton's fern

Fields and woodlands. Common. May-June.

POLYPODIACEAE

Onoclea sensibilis L.

Sensitive fern

Wet places. Common. August.

Matteuccia struthiopteris (L.) Todaro

Onoclea struthiopteris Hoffm.

Ostrich fern

Along streams in alluvial soil. Common. August.

Dennstaedtia punctilobula (Michx.) Bernh.

Dicksonia pilosiuscula Willd.

Hay-scented fern

Open woods and thickets. Common. August.

Cystopteris bulbifera (L.) Bernh.

Bulblet-bearing fern

Rocky woodlands. Rare. Near Campville. July-August.

Cystopteris fragilis (L.) Bernh.

Brittle fern

In wet, shaded soil and on cliffs. Common. May-July.

Dryopteris acrostichoides (Michx.) Kuntze

Aspidium acrostichoides Sw.

Christmas fern

Woods, specially under evergreens. Common. August.

Dryopteris noveboracensis (L.) Gray

Aspidium noveboracense Sw.

New York fern

Moist woods. Common. August.

Dryopteris thelypteris (L.) Gray

Aspidium thelypteris Sw.

Marsh shield fern

Swamps and low grounds. Common. Summer.

Dryopteris cristata (L.) Gray

Aspidium cristatum Sw.

Crested shield fern

Swamps. Common. July-August.

Dryopteris cristata clintoniana (D. C. Eaton) Underw.

Aspidium cristatum clintonianum (D. C. Eaton) Underw.

Wet woods. Rare. August.

Dryopteris marginalis (L.) Gray

Aspidium marginale Sw.

Marginal shield fern

Rocky banks in deep shade. Common. July-August.

Dryopteris spinulosa (Retz) Kuntze

Aspidium spinulosum (Sw.) Kuntze

Spinulose shield fern

Wet woods and swamps. Infrequent.

Dryopteris spinulosa intermedia (Muhl.) Underw.

Aspidium spinulosum var. intermedium D. C. Eaton

In woods wet or dry. Common. August-September.

Dryopteris boottii (Tuckm.) Underw.

Aspidium boottii Tuckm.

Boott's shield fern

Swamps. Rare. Barton. July-September.

Phegopteris phegopteris (L.) Underw.

P. polypodioides Fee

Long beech fern

Rich woods. Frequent. August.

Phegopteris hexagonoptera (Michx.) Fee

Broad beech fern

Rich woods. Frequent. August.

Phegopteris dryopteris (L.) Fee

Oak fern

Rich moist woods. Common. The three species of Phegopteris are frequently seen growing together. August.

Woodwardia virginica (L.) J. E. Smith

Virginia chain fern

Bogs north of Barton. Rare. July.

Camptosorus rhizophyllus (L.) Link

Walking fern

Found sparingly on a few rocks west of Barton. Au October.

Asplenium trichomanes L.

Maidenhair spleenwort

Rocky walls of deep ravines and on stony banks. Common. July-September.

Asplenium platyneuron (L.) Oakes

A. ebeneum Ait.

Ebony spleenwort

On rocks and banks. Infrequent. July-September.

Asplenium acrostichoides Sw.

A. thelypteroides Michx.

Silvery spleenwort

Rich moist woods. Infrequent. August-October.

Asplenium filix-foemina (L.) Bernh.

Lady fern

In woods, thickets and by walls and fences. Common. The fronds are quite variable. July-August.

Adiantum pedatum L.

Maidenhair fern

Abundant in moist woodlands. July-September.

Pteris aquilina L.

Brake. Bracken.

On shrubby hillsides, borders of fields and roads and in open woods. Common. July-September.

Polypodium vulgare L.

Common polypody

On rocks and rocky banks. Common. Found occasionally in swamps on trunks of trees. June-October.

EQUISETACEAE

Equisetum arvense L.

Field horsetail

Along railways and roadsides. Common. May.

Equisetum sylvaticum L.

Wood horsetail

Moist woods. Common. May.

Equisetum fluviatile L.

E. limosum L.

Swamp horsetail

River shores. Common. May-June.

Equisetum hyemale L.

Scouring rush

Wet places and on banks. Frequent. May-June.

LYCOPODIACEAE

Lycopodium lucidulum Michx.

Shining club moss

In damp hemlock woods. Common. August-October.

Lycopodium obscurum L.

Ground pine

Moist woods. Common. July-September.

Lycopodium annotinum L.

Stiff club moss

In a thicket near Apalachin. Rare. September-November.

Lycopodium clavatum L.

Running pine. Club moss

Found in thickets, open woods and along bushy roadsides. Common. August-October.

Lycopodium complanatum L.

Trailing Christmas green

Thickets, open woods, specially in groves of young coniferous trees. Common. Autumn.

Lycopodium chamaecyparissus A. Br.

Found with the last and generally considered a variety of that species. Professor Underwood makes it a distinct species in his work, *Our Native Ferns*. Autumn.

ISOETACEAE

Isoetes engelmanni A. Br.

Engelmann's quillwort

Frequent along the Susquehanna at Apalachin. August.

Isoetes engelmanni gracilis Engelm.

Found with the last. August.

SPERMATOPHYTA

Seed-bearing plants

PINACEAE

Pinus strobus L.

White pine

Very common. Formerly this was the principal forest tree of this region, but now it occurs chiefly as a small tree, though, scattered here and there, specimens of primeval trees are still found.

Pinus resinosa Ait.

Red pine. Canadian pine

Very rare. A single specimen was observed near Barton in 1897. According to old settlers it was formerly quite frequent. June.

Pinus rigida Mill.

Pitch pine

Common. A much smaller tree than the white pine and less valuable. May.

Tsuga canadensis (L.) Carr.

Hemlock

Common. The young trees are the most graceful of evergreens. May.

Taxus minor (Michx.) Britton

T. canadensis Willd.

Ground hemlock. American yew

Moist, shaded banks and along streams. Frequent. Abundant near Apalachin and at the Delaware, Lackawanna and Western narrows west of Owego. Sometimes mistaken for a juniper. May.

TYPHACEAE

Typha latifolia L.

Broad-leaved cattail

Swamps. Abundant. June.

SPARGANIACEAE

Sparganium eurycarpum Engelm.

Broad-fruited bur reed

Marshes and borders of streams. Common. May-August.

Sparganium simplex Huds.

Simple-stemmed bur reed

The same situations as the last, but less frequent. June-August.

NAIADACEAE

Potamogeton natans L.

Common floating pondweed

Ponds and slow streams. Common. July-August.

Potamogeton nuttallii Cham. & Sch.

P. pennsylvanicus Cham.

Nuttall's pondweed

Ponds and streams. Common. July-August.

Potamogeton lonchites Tuckerm.

P. fluitans Roth

Long-leaved pondweed

In the river. Frequent. July-October.

Potamogeton perfoliatus L.

Clasping-leaved pondweed

In the river. Frequent. July-September.

Potamogeton crispus L.

Curled-leaved pondweed

In the river. Infrequent. August.

Potamogeton zosteraefolius Schum.

Eelgrass pondweed

In the river. Frequent. July-August.

Potamogeton pectinatus L.

Fennel-leaved pondweed

In the river. Common. July-August.

Zannichellia palustris L.

Zannichellia

The Susquehanna river. Infrequent. July-September.

Naias flexilis (Willd.) Rost. & Schmidt.

Slender naias

Frequent in the river. Summer.

ALISMACEAE

Alisma plantago-aquatica L.

Water plantain

Swamps, low grounds and along streams. Common. Summer.

Sagittaria latifolia Willd.

S. variabilis Engelm.

Broad-leaved arrowhead

In wet ground or shallow water. Common. Summer.

Sagittaria rigida Pursh

S. heterophylla Pursh

Sessile-fruiting arrowhead

Along the border of the river. Frequent. Generally found in shallow water. July-September.

Sagittaria graminea Michx.

Grass-leaved arrowhead

Shallow water along the Susquehanna. Frequent. Abundant at Apalachin. July-September.

VALLISNERIACEAE

Philotria canadensis (Mich.) Britton

Elodea canadensis Michx.

Ditch moss

Ponds and streams. Common. May-August.

Vallisneria spiralis L.

Eelgrass

Common in the river. Summer.

GRAMINEAE

Andropogon scoparius Michx.

Little blue stem. Broom beard grass

Dry banks along the river. Common. August-September.

Andropogon furcatus Muhl.

Big blue stem. Forked bearded grass

Dry banks along the river. Common. This grass has a very wide range east of the Rocky mountains. It is very abundant in the Missouri region, and is highly prized for hay. August-September.

Chrysopogon avenaceus (Michx.) Benth.

Indian grass

Found with the two preceding species but less common. A grass of wide distribution and specially abundant in South Dakota, where it is highly valued as a hay-producing species. August-September.

Snytherisma sanguinalis (L.) Nash

Panicum sanguinale L.

Large crab grass

Cultivated ground. Common. A grass of no agricultural value in the north, but in the south it is frequently cut for hay. July-August.

Snytherisma linearis (Krock.) Nash

Panicum glabrum Gaud.

Small crab grass

Cultivated fields. Common. July-September.

Panicum crus-galli L.

Barnyard grass

Cultivated soil and along streams. Common. A coarse, succulent grass and valuable forage plant for the silo. Autumn.

Panicum agrostidiforme Lam.

P. agrostoides Muhl.

Agrostis-like panicum

Wet, gravelly shores along the river. Frequent. July-September.

Panicum porterianum Nash

P. latifolium L.

Porter's panicum

Open woods and thickets. Frequent. June-July.

Panicum commutatum Schultes

Variable panicum

Dry bank. Apalachin. Rare. June-July.

Panicum macrocarpon Le Conte

Large-fruited panicum

Open woods and thickets. Common. July.

Panicum clandestinum L.

Hispid panicum

On the banks of the river and along streams. Common. June-July.

Panicum xanthophysum Gray

Slender panicum

Dry bank 2 miles east of Campville. Rare. June-July.

Panicum dichotomum L.

Forked panicum

Thickets both dry and wet. Common. June-July.

Panicum pubescens Lam.

Hairy panicum

Fields and thickets. Abundant. June-August.

Panicum depauperatum Muhl.

Starved panicum

Dry banks. Frequent. June-September.

Panicum linearifolium Scribn.

Linear-leaved panicum

Dry banks. Common. This species is more plentiful than the last, which it closely resembles. June-August.

Panicum virgatum L.

Tall smooth panicum. Switch grass

Along the river. Common. August-September.

Panicum miliaceum L.

Millet

A cultivated grass which frequently escapes. July.

Panicum proliferum Lam.

Spreading panicum

River shore. Frequent. Abundant in some places. August.

Panicum capillare L.

Witch grass

Cultivated grounds, woods, fields and along streams. Common. Summer.

Ixophorus viridis (L.) Nash

Setaria viridis Beauv.

Green foxtail

Cultivated fields. Common. July-September.

Ixophorus glaucus (L.) Nash

Setaria glauca Beauv.

Yellow foxtail. Pigeon grass

Fields and roadsides. Common. July-September.

Ixophorus italicus (L.) Nash

Setaria italica Kunth

Italian millet. Hungarian grass

Waste places. Infrequent. This species together with I. germanicus is found in cultivation throughout. August.

Homalocenchrus virginicus (Willd.) Britton

Leersia virginica Willd.

White grass

Damp, shaded places. Common. August-September.

Homalocenchrus oryzoides (L.) Poll.

Leersia oryzoides Sw.

Rice cut grass

Marshes and wet places along streams. Common. August-September.

Phalaris arundinacea L.

Reed canary grass

Borders of ponds and streams. Infrequent. July-August.

Phalaris canariensis L.

Canary grass

Waste places. Infrequent. Does not persist long. August.

Anthoxanthum odoratum L.

Sweet vernal grass

Roadsides and pastures. Frequent. June-July.

Aristida dichotoma Michx.

Poverty grass

In poor, thin soil at Apalachin. September.

Oryzopsis asperifolia Michx.

White-grained mountain rice

Upland woods. Frequent. May.

Oryzopsis melanocarpa Muhl.

Black mountain rice

Rocky hillsides in woods west of Barton. Plentiful. August.

Milium effusum L.

Wild millet

Damp woods. Infrequent. June-July.

Muhlenbergia mexicana (L.) Trin.

Mexican drop seed

Low grounds. Common. August-September.

Muhlenbergia racemosa (Michx.) B. S. P.

M. glomerata Trin.

Marsh muhlenbergia

Dry, stony bank at Apalachin. Apparently not found in our swamps. September.

Muhlenbergia sylvatica Torr.

Woodland drop seed

Banks of the river and along streams. Common. September.

Muhlenbergia tenuiflora (Willd.) B. S. P.

M. willdenovii Trin.

Slender-flowered drop seed

Dry thicket near Apalachin. Plentiful. August-September.

Muhlenbergia diffusa Schreb.

Nimble will

Woods and roadsides. Frequent. Found also in shady lawns. September.

Brachyelytrum erectum (Schreb.) Beauv.

B. aristatum R. & S.

Brachyelytrum

Moist woods. Common. July-August.

Phleum pratense L.

Timothy. Herd's grass

Fields and waysides. Abundant.

Alopecurus geniculatus L.

A. geniculatus var. aristulatus Torr.

Marsh foxtail

Marshland swamp and along streams at Apalachin. Frequent. This grass is said to make a beautiful lawn, remaining green throughout the winter. July-August.

Alopecurus pratensis L.

Meadow foxtail

Meadow lands at Apalachin. Infrequent. An excellent pasture grass. June-July.

Sporobolus vaginaeflorus (Torr.) Wood

Sheathed rush grass

Roadside in poor soil. Common. September.

Cinna arundinacea L.

Wood reed grass

Borders of ponds and streams. Common. Found also in swamps. August-September.

Cinna latifolia (Trev.) Griseb.

C. pendula Trin.

Slender wood reed grass

Damp woods and borders of ponds and streams. Frequent. August-September.

Agrostis alba L.

Redtop

Grass lands. Common. July-August.

Agrostis vulgaris With.

Redtop. Herd's grass

Meadows, fields and pastures. Common. July-August.

Agrostis stolonifera L.

Creeping bent grass

Damp shores and pasture lands. Frequent. This and the preceding one are regarded by some as only varieties of Agrostis alba. July-August.

Agrostis perennans (Walt.) Tuckerm.

Thin grass

Shaded places. Common. July-August.

Agrostis hyemalis (Walt.) B. S. P.

A. scabra Willd.

Rough hair grass

Damp shaded places. Common. July-August.

Calamagrostis canadensis (Michx.) Beauv.

Blue joint grass

River banks. Common. Found at Apalachin on a hilltop. August.

Calamagrostis cinnoides (Muhl.) Scribn.

C. nuttalliana Steud.

Nuttall's reed grass

Two miles east of Campville. Rare. August.

Holcus lanatus L.

Velvet grass. Meadow soft grass

Meadows and pasture lands. Frequent. June-August.

Deschampsia caespitosa (L.) Beauv.

Tufted hair grass

River shore. Infrequent. Near Campville. August.

Deschampsia flexuosa (L.) Trin.

Wavy hair grass

River bank at Apalachin. Infrequent. July-August.

Avena striata Michx.

Purple oat

Damp woods. Infrequent. Woods at Mutton hill pond. July.

Arrhenatherum elatius (L.) Beauv.

Oat grass

Meadows and pastures at Apalachin. Frequent. Cultivated for hay. June-August.

Danthonia spicata (L.) Beauv.

Wild oat grass

Dry, sterile soil. Common. A form of this grass with the leaves and lower sheaths clothed with long, soft hairs is frequent in dry thickets. July-August.

Danthonia compressa Austin

Flattened wild oat grass

Woods and shaded places. Frequent. August.

Spartina cynosuroides (L.) Willd.

Fresh-water cord grass

River shores. Infrequent. August-September.

Eragrostis capillaris (L.) Nees

Capillary eragrostis

Dry banks and meadows. Frequent. Campville flats.

Eragrostis frankii Steud.

Frank's eragrostis

River shores. Infrequent. Abundant in an old gravel pit near Apalachin. September.

Eragrostis pilosa (L.) Beauv.

Tufted eragrostis

Roadsides in poor soil. Common. August.

Eragrostis purshii Schrad.

Pursh's eragrostis

Plentiful at a sand bank at Apalachin and along roadsides. August-September.

Eragrostis pectinacea (Michx.) Steud.

Purple eragrostis

Meadows at Apalachin. Rare. A beautiful species. August.

Eragrostis hypnoides (Lam.) B. S. P.

E. reptans Nees

Creeping eragrostis

Along the river and in wet places. Common. August.

Eatonia pennsylvanica (DC.) Gray

Eaton's grass

Moist thickets and swamps. Frequent. July.

Eatonia nitida (Spreng.) Nash

E. dudleyi Vasey.

Slender eatonia

Frequent on wooded banks at Apalachin. May-June.

Koeleria cristata (L.) Pers.

Koeleria

Dry bank near Campville. Infrequent. A western species which reaches its eastern limit with us. August.

Dactylis glomerata L.

Orchard grass

Grass lands. Common. June-July.

Cynosurus cristatus L.

Dog-tail grass

Plentiful in a pasture at Campville. Adventive from Europe. July.

Poa annua L.

Low spear grass

Dooryards, lawns and waste places. Common. May-October.

Poa compressa L.

English blue grass. Wire grass

Meadows and other grass lands. Common. A slender form is found in woods. June-July.

Poa pratensis L.

Kentucky blue grass. June grass

In all meadows and pastures. The most common of our grasses. June-July.

Poa trivialis L.

Roughish meadow grass

Plentiful in swamps and wet places at Apalachin. July.

Poa flava L.

P. serotina Ehrh.

False redtop. Fowl meadow grass

Low meadows and along streams. Common. July-August.

Poa debilis Torr.

Weak spear grass

Woods and thickets. Frequent. May-June.

Poa alsodes Gray

Grove meadow grass

Wet woods. Infrequent. May-June.

Panicularia laxa Scribn.

Northern manna grass

Swamps at Apalachin. Infrequent. August.

Panicularia canadensis (Michx.) Kuntze

Glyceria canadensis Trin.

Rattlesnake grass

Swamps. Common. July-August.

Panicularia nervata (Willd.) Kuntze

Glyceria nervata Trin.

Nerved manna grass

Swamps, woods and damp places. Common. June-September.

Panicularia americana (Torr.) MacM.

Glyceria grandis Wats.

Tall manna grass

Swamps and along streams. Frequent. July-August.

Panicularia pallida (Torr.) Kuntze

Glyceria pallida Trin.

Pale manna grass

Marshland swamp and swamp east of Campville. Frequent. July-August.

Panicularia fluitans (L.) Kuntze

Glyceria fluitans R. Br.

Floating manna grass

Marshland swamp and swamp east of Campville. Frequent July-August.

Panicularia borealis Nash

Northern manna grass

Marshland swamp. Frequent. Apparently a slender form of the preceding species. July-August.

Panicularia acutiflora (Torr.) Kuntze

Glyceria acutiflora Torr.

Sharp-scaled manna grass

Marshland swamp and swamp east of Campville. Infrequent. June-August.

Festuca ovina L.

Sheep's fescue

Plentiful in pastures and at Campville. June.

Festuca ovina duriuscula (L.) Hack.

Hard fescue

Banks of the river. Frequent. July.

Festuca elatior L.

Tall fescue

Grass lands. Common. A valuable grass either for mowing or for pasture. July-August.

Festuca nutans Willd.

Nodding fescue

Damp woods. Frequent. July.

Bromus ciliatus L.

Wood chess

Low woods and banks of streams. Common. July-August.

Bromus pubescens Muhl.

B. ciliatus purgans (L.) Gray

Soft chess

Thicket near Apalachin. July. Distinct from the last both in appearance and habitat.

Bromus kalmii Gray

Kalm's chess

In rocky woods. Frequent. July-August.

Bromus secalinus L.

Cheat. Chess

Frequent in wheat fields. June-August.

Bromus racemosus L.

Upright chess

In fields and along railways. Frequent. July-August.

Lolium perenne L.

Rye grass

Pasture land at Campville. Frequent. July.

Lolium italicum A. Br.

Italian rye grass

Meadow lands at the Marshland farm. Frequent. A much coarser grass than the last. July.

Agropyron repens (L.) Beauv.

Quack grass

Grass lands, specially around barns and dwellings. Common. July-September.

Agropyron caninum (L.) R. & S.

Awned wheat grass

Open woods and thickets and along their borders. Frequent. July.

Hordeum jubatum L.

Squirrel tail grass

Along the Delaware, Lackawanna and Western Railroad and in gardens, as a weed, at Apalachin. Infrequent. July.

Elymus striatus Willd.

Slender wild rye

River banks in shade. Common. June.

Elymus virginicus L.

Terrell grass

River banks. Common. July-August.

Elymus canadensis L.

Nodding wild rye

River banks. Abundant. July-August.

Elymus canadensis glaucifolius (Willd.) Torr.

Glaucous wild rye

With the preceding species and evidently only a glaucous form of it. July-August.

Hystrix hystrix (L.) Millsp.

Asprella hystrix Willd.

Bottle brush grass

In rocky woods and along streams. Frequent. Spikelets easily detached. July.

CYPERACEAE

Cyperus diandrus Torr.

Low cyperus

Along streams in wet soil. Frequent. August-September.

Cyperus rivularis Kunth

Shining cyperus

In wet soil, specially along Apalachin creek. Frequent. August-September.

Cyperus inflexus Muhl.

C. aristatus Rottb.

Awned cyperus

In wet soil along the river shores. Infrequent. August.

Cyperus esculentus L.

Yellow nut grass

Along streams and in damp fields. Common. In some places a troublesome weed. August-October.

Cyperus strigosus L.

Straw-colored cyperus

In moist meadows or along streams. Common. A species presenting numerous forms. August-October.

Dulichium arundinaceum (L.) Britton.

D. spathaceum Pers.

Dulichium

Swamps. Very common. August-October.

Eleocharis ovata (Roth) R. & S.

Ovoid spike rush

Swamps and in all wet soil. Common. July-September.

Eleocharis acicularis (L.) R. & S.

Needle spike rush

In wet soil. Common. July-September.

Stenophyllus capillaris (L.) Britton

Fimbristylis capillaris Gray

Hairlike stenophyllus

Campville river flats. Frequent. August.

Scirpus planifolius Muhl.

Wood club rush

In dry woods and thickets. Frequent. May-June.

Scirpus americanus Pers.

S. pungens Vahl

Chair-maker's rush

On the river shores. Frequent. Abundant at Apalachin. August.

Scirpus torreyi Olney

Torrey's bulrush

Plentiful at Mutton hill pond in the outlet. August.

Scirpus lacustris L.

Great bulrush. May rush

In shallow water along the river. Common. August.

Scirpus atrovirens Muhl.

Dark green bulrush

Swamps and wet places. Common. July.

Scirpus polyphyllus Vahl

Leafy bulrush

Wet woods and along streams. Frequent. August.

Scirpus cyperinus (L.) Kunth

Eriophorum cyperinum L.

Wool grass

In all swamps and other wet places. Abundant. August-September.

Scirpus cyperinus eriophorum (Michx.) Britton

Eriophorum cyperinum var. laxum Gray

With the type. Common. Spikelets mostly peduncled. August-September.

Eriophorum polystachyon L.

Tall cotton grass

Mutton hill pond. Rare. June-August.

Eriophorum virginicum L.

Virginia cotton grass

Common in bogs. A form is found at Barton, which approaches the var. album Gray. July-September.

Rynchospora alba (L.) Vahl

White beaked rush

On bogs at Mutton hill pond. Common. July.

Carex intumescens Rudge

Bladder sedge

In wet woods, bogs and swamps. Common. June-July.

Carex asa-grayi Bailey

C. grayi Carey

Gray's sedge

Plentiful in a small swamp at Barton. July.

Carex lupulina Muhl.

Hop sedge

Swamps. Common. July.

Carex lupulina bella-villa (Dewey) Bailey

Swamp east of Campville. Infrequent. July.

Carex utriculata Boott

Bottle sedge

Abundant at the Marshland swamp. June-July.

Carex monile Tuckerm.

Necklace sedge

Swamps. Common. July.

Carex tuckermani Dewey

Tuckerman's sedge

In swamps, bogs and wet meadows. Common. June-July.

Carex retrorsa Schwein.

Retrorse sedge

Swamps. Infrequent. June-July.

Carex lurida Wahl.

Sallow sedge

Swamps and low grounds. Abundant. June-July.

Carex baileyi Britton

C. lurida var. gracilis Bailey

Bailey's sedge

Swamp near Campville. Infrequent. July.

Carex hystricina Muhl.

Porcupine sedge

Swamps. Infrequent. June-July.

Carex pseudo-cyperus L.

Cyperuslike sedge

Swamp east of Campville. Rare. July-August.

Carex comosa Boott

C. pseudo-cyperus var. americana Hochst.

Bristly sedge

Swamps. Common. July-August.

Carex trichocarpa Muhl.

Hairy-fruited sedge

Along the river banks. Abundant. Found also in swamps. June-July.

Carex riparia Curtis

River bank sedge

Abundant at the Marshland swamp. June.

Carex scabrata Schwein.

Rough sedge

In wet, shaded places. Common. June-July.

Carex lanuginosa Michx.

C. filiformis var. latifolia Boeckl.

Woolly sedge

Mutton hill pond. Infrequent. June.

Carex filiformis L.

Slender sedge

Frequent in all swamps in the vicinity of Apalachin. June-July.

Carex stricta Lam.

Tussock sedge

Along the river and on the edges of swamps. Common. May-June.

Carex torta Boott

Twisted sedge

On banks of streams. Frequent. June.

Carex prasina Wahl.

Drooping sedge

Plentiful at Mutton hill pond. May-July.

Carex crinita Lam.

Fringed sedge

Swamps, wet places and ditches. Frequent. June-July.

Carex gynandra Schwein.

Nodding sedge

Found in the same situations as C. crinita, but much more common. June-July.

Carex virescens Muhl.

Downy green sedge

In grassy places. Infrequent. June.

Carex triceps Michx.

C. triceps var. hirsuta Bailey

Hirsute sedge

On dry knolls. Frequent. June.

Carex gracillima Schwein.

Graceful sedge

In moist woodlands. Common. June.

Carex longirostis Torr.

Long-beaked sedge

Plentiful in thickets along the river banks at Barton. May-June.

Carex arctata Boott

Drooping wood sedge

In open woods. Infrequent. May-June.

Carex tenuis Rudge

C. debilis var. rudgei Bailey

Slender-stalked sedge

Low woods. Common. June-July.

Carex grisea Wahl.

Gray sedge

In shaded places. Common. June.

Carex amphibola Steud.

Narrow-leaved sedge

River bank at Apalachin. Infrequent. Verified by Dr Thomas C. Porter. June.

Carex granularis Muhl.

Meadow sedge

Moist ground in meadows. Infrequent. June.

Carex pallescens L.

Pale sedge

In fields and along roadsides at Apalachin. June.

Carex laxiflora Lam.

Loose-flowered sedge

Woods, ravines and open places. Common. May-June.

Carex laxiflora blanda (Dewey) Boott

Woods and fields. Frequent. May-June.

Carex laxiflora varians Bailey

Found with the type. Frequent. May-June.

Carex laxiflora patulifolia (Dewey) Carey

In ravines and damp shades. Common. May-June.

Carex styloflexa Buckley

C. laxiflora var. styloflexa Boott

Bent sedge

Damp soil at Barton. Rare. June.

Carex digitalis Willd.

Slender wood sedge

Open woods and thickets. Infrequent. June.

Carex albursina Sheldon

C. laxiflora var. latifolia Boott

White bear sedge

Rich, moist soil in woods, specially in shaded ravines. Frequent. June.

Carex plantaginea Lam.

Plantain-leaved sedge

Shaded banks and open woods. Infrequent. Near Owego. May-June.

Carex laxiculmis Schwein.

Spreading sedge

In woods and coppices. Frequent. June.

Carex pedunculata Muhl.

Long-stalked sedge

Plentiful in a damp thicket at Barton. May-June.

Carex pedicellata (Dewey) Britton

C. communis Bailey

Fibrous-rooted sedge

Dry banks in open thickets. Common. May-June.

Carex pennsylvanica Lam.

Pennsylvania sedge

Dry soil in woods, thickets and open places. Very common. May-June.

Carex varia Muhl.

Emmons sedge

On hilltops in either dry or damp woods at Apalachin. Infrequent. May-June.

Carex pubescens Muhl.

Pubescent sedge

Open woods at Barton. Infrequent. June.

Carex leptalea Muhl.

C. polytrichoides Muhl.

Bristle-stalked sedge

Swamps. Common. June.

Carex stipata Muhl.

Awl-fruited sedge

Swampy fields. Very common. June.

Carex vulpinoidea Michx.

Fox sedge

Swamps, ditches and fields. Very common. June.

Carex xanthocarpa Bicknell

Yellow-fruited sedge

In dry fields at Apalachin. Common. Easily distinguished from C. vulpinoidea by its bright yellow, plano-convex perigynia. June.

Carex tenella Schk.

Soft-leaved sedge

Swamp north of Campville. June.

Carex rosea Schk.

Stellate sedge

Woods and open places. Common. June.

Carex rosea radiata Dewey

With the type. June.

Carex retroflexa Muhl.

C. rosea var. retroflexa Torr.

Reflexed sedge

Rich woods. Infrequent. June.

Carex muricata L.

Lesser prickly sedge

Dry bank at Apalachin. Introduced from Europe. June.

Carex sparganioides Muhl.

Bur reed sedge

Shaded places, wet or dry. Common. June-July.

Carex cephaloidea Dewey

Thin-leaved sedge

Moist places in woods and fields. Frequent. June-July.

Carex cephalophora Muhl.

Oval-headed sedge

Dry knolls and open woodland. Common. June.

Carex muhlenbergii Schk.

Muhlenberg's sedge

Dry bank at Apalachin. Rare. June.

Carex sterilis Willd.

C. echinata var. microstachys Boeckl.

Little prickly sedge

Bogs. Mutton hill pond. Frequent. May-June.

Carex sterilis cephalantha Bailey

C. echinata var. cephalantha Bailey

With the type at Mutton hill pond. May-June.

Carex canescens L.

Silvery sedge

Plentiful at Mutton hill pond. May-June.

Carex trisperma Dewey

Three-fruited sedge

Swamps near Barton and Campville. June-August.

Carex deweyana Schwein.

Dewey's sedge

Dry, open woods. Common. June.

Carex bromoides Schk.

Broomlike sedge

Shaded swamps and wet woodlands. Common. June.

Carex tribuloides Wahl.

Blunt broom sedge

Low moist ground, swamps and swales. Common. July.

Carex tribuloides bebbii Bailey

Wet places. Occasional. July.

Carex scoparia Schk.

Pointed broom sedge

Common in open fields and ditches. July.

Carex scoparia minor Boott

Dry woods. Barton. June.

Carex cristatella Britton

C. tribuloides var. cristata Bailey

Crested sedge

Plentiful in fields at Apalachin. July-September.

Carex foenea Willd.

Hay sedge

Dry banks at Apalachin. Rare. June-July.

Carex straminea Willd.

Straw sedge

Coppices and open fields. Frequent. June-July.

Carex festucacea Willd.

C. straminea var. brevior Dewey

Fescue sedge

In a dry thicket on a hilltop near Apalachin. Rare. June.

ARACEAE

Arisaema triphyllum (L.) Torr.

Indian turnip. Jack-in-the-pulpit

Rich moist woodlands and ravines. Common. The corm, when fresh, is very acrid. June.

Arisaema dracontium (L.) Schott

Green dragon

Shaded alluvial soil along the river. Frequent. June.

Calla palustris L.

Water arum. Wild calla

Swamps. Common. Generally found growing in water. May-June.

Spathyema foetida (L.) Raf.

Symplocarpus foetidus Nutt.

Skunk cabbage

Alluvial soil along the river and its branches. Common. March-April.

Acorus calamus L.

Sweet flag

Wet places, specially near dwellings. Frequent. June.

LEMNACEAE

Spirodela polyrhiza (L.) Schleid.

Great duckweed

Stagnant pools and water holes. Common. Summer.

Lemna minor L.

Small duckweed

With the last but less common. Summer.

PONTEDERIACEAE

Heteranthera dubia (Jacq.) MacM.

H. graminea Vahl

Water star grass

In shallow water along the river. Common. August.

JUNCACEAE

Juncus effusus L.

Soft rush

Wet places. Common. Summer.

Juncus bufonius L.

Toad rush

Roadsides. Common. Summer.

Juncus tenuis Willd.

Yard rush

Along paths and waysides. Common. Summer.

Juncus nodosus L.

Knotted rush

River shores and damp places. Common. Summer.

Juncus canadensis J. Gay

J. canadensis var. longicaudatus Engelm.

Canada rush

Wet places. Mutton hill pond and Marshland swamp. Summer.

Juncus canadensis brevicaudatus Engelm.

J. canadensis var. coarctatus Engelm.

Narrow-panicled rush

Juncus acuminatus Michx.

Sharp-fruited rush

Marshes and ditches. Common. Summer.

Juncoides pilosum (L.) Kuntze

Luzula vernalis DC.

Hairy wood rush

Damp woods and bushy places. Common. May.

Juncoides campestre (L.) Kuntze

Luzula campestris DC.

Common wood rush

Dry soil in pastures and clearings. Common. April-May.

MELANTHACEAE

Chamaelirium luteum (L.) Gray

C. carolinianum Willd.

Blazing star

Woods and thickets, wet or dry. Frequent. June.

Veratrum viride Ait.

Hellebore. Indian poke

Alluvial soil along the river and other streams. Common. June.

Uvularia perfoliata L.

Perfoliate bellwort

Rich woods and coppices. Common. May.

Uvularia grandiflora J. E. Smith

Large-flowered bellwort

Woods and thickets. Frequent. Plentiful at Barton. May.

Uvularia sessilifolia L.

Oakesia sessilifolia Wats.

Sessile-leaved bellwort

Low woods and ravines. Common. May.

LILIACEAE

Hemerocallis fulva L.

Day lily

Escaped from cultivation and established by roadsides. June-August.

Allium tricoccum Ait.

Wild leek

Alluvial soil along the river. Common. July.

Allium cernuum Roth

Nodding wild onion

High banks of the river and rocky places. Frequent. Barton. July.

Allium canadense L.

Meadow garlic

Thickets along the river. Frequent. May.

Lilium philadelphicum L.

Wood lily

Dry woods and thickets. Frequent. June.

Lilium canadense L.

Canada lily

River banks. Frequent. June-July.

Lilium superbum L.

Turk's cap lily

River banks. Abundant at Apalachin. July-August.

Erythronium americanum Ker

Yellow adder's-tongue

Damp woods and pastures, specially along streams. Common. April-May.

Ornithogalum umbellatum L.

Star of Bethlehem

Escapes from cultivation. Occasional. May.

Muscari botryoides (L.) Mill.

Occasionally escapes from cultivation. Roadside at Owego. April.

CONVALLARIACEAE

Asparagus officinalis L.

Asparagus

Fields and roadsides. Infrequent. May-October.

Clintonia borealis (Ait.) Raf.

Yellow clintonia

Cool, damp woods. Frequent. May-June.

Vagnera racemosa (L.) Morong

Smilacina racemosa Desf.

False Solomon's seal

Woods, ravines and river banks. Common. May.

Unifolium canadense (Desf.) Greene

Maianthemum canadense Desf.

False lily of the valley

Damp woods and thickets. Common. May-June.

Streptopus roseus Michx.

Sessile-leaved twisted stalk

Cool, damp woods. May-June.

Polygonatum biflorum (Walt.) Ell.

Hairy Solomon's seal

Woods, fence rows and river banks. Common. May.

Polygonatum commutatum (R. & S.) Dietr.

P. giganteum Dietr.

Smooth Solomon's seal

River banks. Common. June. The young shoots are used as a substitute for asparagus.

Medeola virginiana L.

Indian cucumber root

Rich, moist woods. Common. May-June.

Trillium grandiflorum (Michx.) Salisb.

Large-flowered wake-robin

Woods and river banks. Common. May.

Trillium erectum L.

Ill scented wake-robin

Rich woods, ravines and river banks. Common. May.

Trillium undulatum Willd.

T. erythrocarpum Michx.

Painted wake-robin

Cool, damp woods. Infrequent. Apalachin. June.

SMILACEAE

Smilax herbacea L.

Carrion flower

Woods, fence rows and banks of streams. Frequent. June.

Smilax hispida Muhl.

Hispid green brier

Thickets. Frequent. June.

AMARYLLIDACEAE

Hypoxis hirsuta (L.) Coville

H. erecta L.

Star grass

Dry woods. Frequent. May-October.

DIOSCOREACEAE

Dioscorea villosa L.

Wild yam root

Thickets along the river. Frequent. Apalachin. June-July.

IRIDACEAE

Iris versicolor L.

Larger blue flag

Swamps and shores. Common. May-July.

Sisyrinchium graminoides Bickn.

S. anceps Cav.

Stout blue-eyed grass

Grassy places. Frequent. June.

Sisyrinchium angustifolium Mill.

Pointed blue-eyed grass

Meadows and pastures. Common. May-August.

ORCHIDACEAE

Cypripedium acaule Ait.

Stemless lady's slipper

Woods, specially on the site of decayed logs. Frequent. May-June.

Cypripedium hirsutum Mill.

C. pubescens Willd.

Large yellow lady's slipper

Wet woods and swamps. Infrequent. June.

Cypripedium parviflorum Salisb.

Small yellow lady's slipper

Wet or dry woods. Common. June.

Orchis spectabilis L.

Showy orchis

Damp woods. Tioga Center. Rare. May.

Habenaria orbiculata (Pursh) Torr.

Large round-leaved orchis

Rich woods. Barton. Infrequent. July.

Habenaria hookeriana Gray

Hooker's orchis

Damp woods. Barton. Infrequent. June.

Habenaria clavellata (Michx.) Sprong.

H. tridentata Hook.

Small green wood orchis

Swamps near Barton. Infrequent. August.

Habenaria lacera (Michx.) R. Br.

Ragged orchis

Swamps. Apalachin. Frequent. July.

Habenaria psycodes (L.) Gray

Purple-fringed orchis

Damp woods. Common. July-August.

Pogonia ophioglossoides (L.) Ker

Rose pogonia

Mutton hill pond and bogs north of Barton. July.

Gyrostachys cernua (L.) Kuntze

Spiranthes cernua Rich.

Nodding ladies' tresses

Damp open places. Common. September.

Gyrostachys gracilis (Bigel.) Kuntze

Spiranthes gracilis Bigel.

Slender ladies' tresses

Dry thickets and specially in pine groves. Infrequent. Apalachin. August.

Peramium repens (L.) Salisb.

Goodyera repens R. Br.

Small rattlesnake plantain

Evergreen woods. Infrequent. July-August.

Peramium repens ophioides Fern.

With the type but more frequent. July-August.

Peramium pubescens (Willd.) MacM.

Goodyera pubescens R. Br.

Downy rattlesnake plantain

Woods, usually under evergreens. Frequent. July-August.

Leptorchis loeselii (L.) MacM.

Liparis loeselii Richards.

Fen orchis

Damp places. Barton and Apalachin. Rare. June.

Corallorhiza odontorhiza (Willd.) Nutt.

Small-flowered coral root

Woods and thickets. Infrequent. August-September.

Corallorhiza multiflora Nutt.

Large coral root

Woods and thickets. Frequent. August.

Limodorum tuberosum L.

Calopogon pulchellus R. Br.

Grass pink. Calopogon

Bogs north of Barton. July.

JUGLANDACEA

Juglans nigra L.

Black walnut

Banks of the river and along streams. Frequent. April-May.

Juglans cinerea L.

Butternut. White walnut

Banks of the river and along streams. Common. April-May.

Hicoria minima (Marsh.) Britton

Carya amara Nutt.

Bitternut

Borders of fields. Frequent. May-June. Nut with a thin shell and very bitter kernel.

Hicoria ovata (Mill.) Britton

Carya alba Nutt.

Shagbark. Shellbark hickory

Woods, thickets and fields. Common. May. The principal hickory nut of the market. A form with very large compressed nuts occurs near Apalachin.

Hicoria alba (L.) Britton

Carya tomentosa Nutt.

Mockernut. White-heart hickory

Fields and woods. Not common. Nut thick shelled, seed sweet.

Hicoria microcarpa (Nutt.) Britton

Carya microcarpa Nutt.

Small-fruited hickory

Frequent in fields and along their borders. May-June. Nut small, kernel sweet.

Hicoria glabra (Nutt.) Britton

Carya porcina Nutt.

Pignut

Infrequent. May-June. Nut pointed, thick shelled, kernel somewhat astringent.

MYRICACEAE

Comptonia peregrina (L.) Coulter

Myrica asplenifolia L.

Sweet fern

Thin sterile soil. Common. April-May.

SALICACEAE

Populus alba L.

White poplar

An introduced shade tree, which spreads freely by means of suckers.

Populus balsamifera candicans (Ait.) Gray

Balm of Gilead

River banks. Abundant in some places. April.

Populus grandidentata Michx.

Large-toothed aspen

Hillsides. Common. April.

Populus tremuloides Michx.

American aspen

Woods and thickets. Common. April.

Populus dilatata L.

Lombardy poplar

An introduced tree, frequent near the sites of deserted dwellings.

Salix nigra Marsh.

Black willow

Banks of the river, along streams and on the shores of ponds. Common. May.

Salix lucida Muhl.

Shining willow

Banks of streams. Frequent. May.

Salix fragilis L.

Crack willow. Brittle willow

River banks. Barton. Infrequent. May.

Salix alba vitellina (L.) Koch

White willow

Banks of streams. Common. May.

Salix fluviatilis Nutt.

S. longifolia Muhl.

Sandbar willow

Low land along the river. Frequent. April-May.

Salix bebbiana Sarg.

S. rostrata Richards.

Beaked willow

Swamps and wet places. Common. May.

Salix humilis Marsh.

Prairie willow

Dry hills. Frequent. April.

Salix tristis Ait.

Dwarf gray willow

Uplands. Frequent. March-April.

Salix discolor Muhl.

Pussy willow. Glaucous willow

Wet soil. Common. March-April.

Salix sericea Marsh.

Silky willow

Swamps. Common. May.

Salix cordata Muhl.

Heart-leaved willow

Abundant along the river and other streams and in wet places. April-May.

BETULACEAE

Carpinus caroliniana Walt.

Water beech

Damp woods and along streams. Common. May.

Ostrya virginiana (Mill.) Willd

O. virginica Willd.

Ironwood

Woods and thickets. Frequent. May.

Quercus rubra L.

Red oak

Woods. Common. June.

Quercus coccinea Wang.

Scarlet oak

Woods and thickets. Infrequent. May-June.

Quercus velutina Lam.

Q. coccinea var. tinctoria Gray

Black oak

Woods, thickets, fields and along fences. Common. May-June.

Quercus nana (Marsh.) Sarg.

Q. ilicifolia Wang.

Scrub oak

Hillsides. Common. May. Forming thickets near Campville.

Quercus alba L.

White oak

Common. This species, Q. rubra, Q. velutina, Q. prinus and Castanea dentata constitute the principal forest trees of the region.

Quercus macrocarpa Michx.

Bur oak

Common along the river at Barton. May-June.

Quercus platanoides (Lam.) Sudw.

Q. bicolor Willd.

Swamp white oak

Damp grounds. Apalachin. Rare, but formerly quite plentiful. May-June.

Quercus prinus L.

Rock oak

Upland woods. Common. May-June.

Quercus acuminata (Michx.) Sarg.

Q. muhlenbergii Engelm.

Chestnut oak. Yellow oak

Barton. Rare. May.

Quercus prinoides Willd.

Scrub chestnut oak

Hillsides. Frequent and even abundant in some places. May.

ULMACEAE

Ulmus americana L.

White elm. American elm

Low grounds. Common. April.

Ulmus racemosa Thomas

Rock elm

Woods and thickets. Frequent. March-April.

Ulmus fulva Michx.

Slippery elm

Along the river and creeks. Frequent. March-April.

Celtis occidentalis L.

Hackberry. Sugar tree

River banks. Scarce at Apalachin but more plentiful at Barton and in the western part of our range. April.

MORACEAE

Humulus lupulus L.

Hop

Abundant along the river banks. August.

Cannabis sativa L.

Hemp

Waste places. Occasional. August.

URTICACEAE

Urtica gracilis Ait.

Slender nettle

Fence rows. Common. June-July.

Urticastrum divaricatum (L.) Kuntze

Laportea canadensis Gaud.

Wood nettle

Moist, shaded places. Common. July-August.

Adicea pumila (L.) Raf.

Pilea pumila Gray

Richweed. Clearweed

Damp, shady places. Common. July-September.

Boehmeria cylindrica (L.) Willd.

False nettle

Wet soil. Common. July-September.

SANTALACEAE

Comandra umbellata (L.) Nutt.

Bastard toad flax

Dry thickets. Common. May-July.

ARISTOLOCHIACEAE

Asarum canadense L.

Wild ginger

Abundant in thickets along the river. May.

Asarum reflexum Bickn.

Short-lobed wild ginger

Plentiful in a deep ravine near Campville. Closely resembling A. canadense, and by some regarded as a form of that species. May.

POLYGONACEAE

Rumex acetosella L.

Sheep sorrel. Field sorrel

Everywhere common. Very abundant in newly seeded land. May-September.

Rumex verticillatus L.

Swamp dock

Swamps. Common. May-July.

Rumex britannica L.

Great water dock

Swamps. Frequent. July-August.

Rumex crispus L.

Curled dock

Waste places. Common. June-August.

Rumex sanguineus L.

Red-veined dock

Waste places. Infrequent. Apalachin. May-August.

Rumex obtusifolius L.

Bitter dock

Gardens and fields. Common. June-August.

Fagopyrum fagopyrum (L.) Karst.

F. esculentum Moench

Buckwheat

Frequently persists in fields. June-September.

Polygonum amphibium L.

Water persicaria

In water and along muddy shores. Common. July-August.

Polygonum emersum (Michx.) Britton

P. muhlenbergii Wats.

Swamp persicaria

Shores of the river. Common. July-September.

Polygonum pennsylvanicum L.

Pennsylvania persicaria

In moist, rich soil. Common. July-October.

Polygonum persicaria L.

Lady's thumb

Common everywhere. June-October.

Polygonum hydropiperoides Michx.

Mild water pepper

Along the river at Apalachin. Abundant in one station. June-September.

Polygonum hydropiper L.

Smartweed

Ditches and wet places. Common. July-September.

Polygonum punctatum Ell.

P. acre H. B. K.

Water smartweed

Shores of the river. Frequent. June-October.

Polygonum virginianum L.

Virginia knotweed

Damp thickets. Frequent. July-October.

Polygonum orientale L.

Prince's feather

Waste places. Escaped from cultivation. Infrequent. August-September.

Polygonum aviculare L.

Doorweed. Knotgrass

In dooryards and along footpaths. Common. June-November.

Polygonum erectum L.

Erect knotweed

Roadsides. Common. July-September.

Polygonum convolvulus L.

Black bindweed

Cultivated and waste grounds. Common. July-September.

Polygonum cilinode Michx.

Fringed black bindweed

Infrequent. West of Owego. June-September.

Polygonum scandens L.

Climbing false buckwheat

Banks of streams. Common. August-September.

Polygonum sagittatum L.

Arrow-leaved tear-thumb

Swamps and low grounds. Common. July-September.

Polygonum arifolium L.

Halberd-leaved tear-thumb

Marshes. Frequent. July-September.

CHENOPODIACEAE

Chenopodium album L.

Pigweed

Cultivated and waste grounds. Abundant. June-September.

Chenopodium album viride (L.) Moq.

With the type. Frequent. June-September.

Chenopodium glaucum L.

Oak-leaved goosefoot

Along the railroad at Apalachin. Infrequent. June-September.

Chenopodium hybridum L.

Maple-leaved goosefoot

Waste places. Infrequent. July-September.

Chenopodium botrys L.

Jerusalem oak

Waste places. Infrequent. Apalachin. July-September.

Atriplex hastata L.

A. patulum var. hastatum Gray

Halberd-leaved orache

Waste places. Infrequent. August-October.

AMARANTHACEAE

Amaranthus retroflexus L.

Rough pigweed

Gardens and waste places. Common. August-October.

Amaranthus hybridus L.

A. hypochondriacus L.

Slender pigweed

Waste places. Infrequent. Barton. August-October.

Amaranthus hybridus paniculatus (L.) U. & B.

A. paniculatus L.

Red amaranth

Waste places. Infrequent. August-October.

Amaranthus blitoides Wats.

Prostrate amaranth

Along railroads. Infrequent. Campville. June-October.

Amaranthus graecizans L.

A. albus L.

Tumbleweed

In waste and cultivated places. Common. June-September.

PHYTOLACCACEAE

Phytolacca decandra L.

Poke. Pigeonberry. Garget

Pastures and borders of woods, specially in newly cleared land. Frequent. July.

AIZOACEAE

Mollugo verticillata L.

Carpetweed

Cultivated ground, where it often forms dense mats. Common. Summer.

PORTULACACEAE

Claytonia virginica L.

Spring beauty

Moist woods and banks. Common. April-May.

Claytonia caroliniana Michx.

Carolina spring beauty

Damp woods. Infrequent. April-May.

Portulaca oleracea L.

Purslane. Pussly

Gardens and waste places. Common. Summer.

CARYOPHYLLACEAE

Agrostemma githago L.

Lychnis githago Scop.

Corn cockle

Frequent in wheat fields. July. The seeds are said to be very poisonous.

Silene stellata (L.) Ait.

Starry campion

Dry thickets. Common. June-July.

Silene vulgaris (Moench) Garcke

S. cucubalus Wibel

Bladder campion

Waste places. Infrequent. Barton. Summer.

Silene antirrhina L.

Sleepy catchfly

Along railroads and in waste places. Frequent. Summer.

Silene armeria L.

Sweet william

Spontaneous in gardens. July.

Silene noctiflora L.

Night-flowering catchfly

Waste places. Frequent. June-September.

Saponaria officinalis L.

Soapwort. Bouncing bet

Roadsides and along streams. Common. Summer.

Vaccaria vaccaria (L.) Britton

Saponaria vaccaria L.

Cow herb

Along the railroad at Apalachin. Rare. July.

Dianthus armeria L.

Deptford pink

Roadsides. Infrequent. Apalachin. Summer.

Dianthus barbatus L.

Sweet william

Roadsides and waste places. Common. Summer.

Alsine media L.

Stellaria media Smith

Common chickweed

Very common in damp grounds. March-April.

Alsine longifolia (Muhl.) Britton

Stellaria longifolia Muhl.

Long-leaved stitchwort

Moist, grassy places. Common. May-July.

Alsine graminea (L.) Britton

Stellaria graminea L.

Lesser stitchwort

In fields and along roadsides. Frequent. May-July.

Alsine borealis (Bigel.) Britton

Stellaria borealis Bigel.

Northern stitchwort

Along Apalachin creek. Rare. Summer.

Cerastium vulgatum L.

Mouse-ear chickweed

Roadsides, fields, coppices and waste places. Common. May-October.

Cerastium longipedunculatum Muhl.

C. nutans Raf.

Nodding chickweed. Powderhorn

River flats at Barton. Abundant. May-June.

Cerastium arvense L.

Field chickweed

Dry banks at Barton. Frequent. May-June.

Cerastium arvense oblongifolium (Torr.) H. & B.

With the last but more common. May-June.

Arenaria serpyllifolia L.

Thyme-leaved sandwort

Along railroads. Common. June.

Moehringia lateriflora (L.) Fenzl

Arenaria lateriflora L.

Blunt-leaved sandwort

Shaded places along the river. Frequent. June-July.

Spergula arvensis L.

Corn spurry

Common as a weed in cultivated soil. Summer.

Anychia canadensis (L.) B. S. P.

Slender forked chickweed

Dry woods. Frequent. June-August.

NYMPHAEACEAE

Brasenia purpurea (Michx.) Casp.

B. peltata Pursh

Water target

Mutton hill pond. Summer.

Nymphaea advena Soland.

Nuphar advena Ait. f.

Large yellow pond lily

Mutton hill pond. Summer.

Nymphaea kalmiana (Michx.) Sims

Nuphar kalmianum Ait.

Small yellow pond lily

Marshland swamp. Summer.

Castalia odorata (Dryand.) W. & W.

Nymphaea odorata Ait.

Sweet-scented white water lily

Mutton hill pond. Summer.

CERATOPHYLLACEAE

Ceratophyllum demersum L.

Hornwort

In the river. Frequent. June-July.

MAGNOLIACEAE

Magnolia acuminata L.

Cucumber tree

Frequent throughout the valley as a small tree, the larger trees having been cut for lumber. June.

Liriodendron tulipifera L.

Tulip tree. Whitewood

Rare. June. This tree has been nearly exterminated by the ax of the lumberman.

RANUNCULACEAE

Caltha palustris L.

Cowslip. Marsh marigold

Swamps and wet woodlands. Infrequent. May.

Coptis trifolia (L.) Salisb.

Gold thread

Damp, mossy woods. Common. May.

Actaea rubra (Ait.) Willd.

A. spicata var. rubra Ait.

Red baneberry

Woodlands. Frequent. May-June.

Actaea alba (L.) Mill.

White baneberry

Rich woods. Common. May.

Cimicifuga racemosa (L.) Nutt.

Black cohosh. Black snakeroot

Along the banks of the river, in thickets and borders of woods. Common. June-July.

Aquilegia canadensis L.

Wild columbine

Rocky woods and in meadows. Common. May-June.

Aquilegia vulgaris L.

European columbine

Escapes from cultivation and is frequent along roadsides. May-July.

Delphinium consolida L.

Field larkspur

Waste places about Apalachin. Summer. Naturalized from Europe.

Anemone virginiana L.

Tall anemone

River banks and borders of woods. Common. June-August.

Anemone cylindrica Gray.

Long-fruited anemone

Rare. Barton. June.

Anemone canadensis L.

A. pennsylvanica L.

Canada anemone

Along the river. Common. May-August.

Anemone quinquefolia L.

A. nemorosa L.

Windflower

Moist thickets and woods. Common. May.

Hepatica hepatica (L.) Karst.

H. triloba Chaix

Round-lobed liverleaf

In thickets and woods. Common. March-May.

Hepatica acuta (Pursh) Britton

H. acutiloba DC.

Sharp-lobed liverleaf

In the same situations as the former but less common. March-May.

Clematis virginiana L.

Virgin's bower

Fence rows, banks of streams and thickets. Common. July. A plant more beautiful in fruit than in flower.

Atragene americana Sims

Clematis verticillaris DC.

Purple virgin's bower

Rocky hillsides. Rare. Owego. May.

Ranunculus reptans L.

R. flammula var. reptans E. Meyer

Creeping spearwort

Shores of the Susquehanna. Infrequent. Apalachin. Summer.

Ranunculus abortivus L.

Kidney-leaved crowfoot

Woods and moist ground. Common. May-June.

Ranunculus sceleratus L.

Ditch crowfoot

Ditches. Infrequent. Apalachin and Barton. May-August.

Ranunculus recurvatus Poir.

Hooked crowfoot

Damp woods. Common. May-June.

Ranunculus acris L.

Meadow buttercup

Fields and meadows. Common. May-September.

Ranunculus pennsylvanicus L. f.

Bristly buttercup

Swamps. Frequent. July-August.

Ranunculus septentrionalis Poir.

Swamp buttercup

Along the river and streams and in swamps. Common. May-July.

Ranunculus hispidus Michx.

Hispid buttercup

Dry woods and thickets. Common. April-May.

Ranunculus fascicularis Muhl.

Early buttercup

In the same places as the last species but less common. April-May.

Thalictrum dioicum L.

Early meadow rue

In shaded stony soil. Common. April-May.

Thalictrum polygamum Muhl.

Tall meadow rue

In wet meadows and along streams. Common. July.

BERBERIDACEAE

Berberis vulgaris L.

European barberry

In yards and occasionally as an escape. May-June.

Caulophyllum thalictroides (L.) Michx.

Blue cohosh

Rich woods and thickets. Frequent. May.

Podophyllum peltatum L.

Mandrake. May apple

Low woods, thickets and fence rows. Common. May.

MENISPERMACEAE

Menispermum canadense L.

Canada moonseed

Along the river banks. Frequent. June.

LAURACEAE

Sassafras sassafras (L.) Karst.

S. officinale Nees

Sassafras

Woods, thickets and fence rows. Frequent. May.

Benzoin benzoin (L.) Coulter

Lindera benzoin Blume

Spice bush. Benjamin bush

In swamps and wet places. Frequent. April-May. The leaves of young shoots are much larger than those of the matured branches.

PAPAVERACEAE

Papaver somniferum L.

Garden poppy

In waste places. Occasional. Summer.

Sanguinaria canadensis L.

Bloodroot

Thickets along the river. Common. April-May.

Chelidonium majus L.

Celandine

Roadsides and waste places. Frequent. May-September.

Bicuculla cucullaria (L.) Millsp.

Dicentra cucullaria DC.

Dutchman's breeches

Rich woods and thickets, specially along the river. Common. April-May.

Bicuculla canadensis (Goldie) Millsp.

Dicentra canadensis DC.

Squirrel corn

In the same places as the last but much less frequent. May.

Adlumia fungosa (Ait.) Greene

A. cirrhosa Raf.

Climbing fumitory. Alleghany vine

Moist woods and thickets. Infrequent. Tioga Center. Abundant along the Delaware, Lackawanna and Western railroad in the narrows west of Owego. A very beautiful vine. June-October.

CRUCIFERAE

Lepidium campestre (L.) R. Br.

Cow cress

Fields, waste places and along railroads. Common. May-July.

Lepidium virginicum L.

Wild peppergrass

Roadsides. Common. May-November.

Lepidium apetalum Willd.

Apetalous peppergrass

Roadsides in dry soil. Common. June-July.

Lepidium sativum L.

Peppergrass

Roadsides at Apalachin. Escaped from gardens. Infrequent. June-August.

Sisymbrium officinale (L.) Scop.

Hedge mustard

Waste places. Common. May-November.

Sisymbrium altissimum L.

Tall sisymbrium

Waste places, specially along railroads. Owego. Summer. This is a bad weed of recent introduction, but it is now established in many parts of the State.

Brassica nigra (L.) Koch

Black mustard

Fields and waste places. Common. June-November.

Brassica arvensis (L.) B. S. P.

B. sinapistrum Boiss.

Charlock. Wild mustard

Fields and waste places. Common. May-November.

Brassica campestris L.

Turnip

Occurs occasionally in waste places, but does not persist long. Summer.

Brassica napus L.

Rape

This is cultivated for sheep pasture, but sometimes escapes and persists for a short time.

Raphanus sativus L.

Garden radish

This occasionally escapes from cultivation and is spontaneous for a year or two.

Barbarea barbarea (L.) MacM.

B. vulgaris var. arcuata Gray

Yellow rocket

Fields. Common. May-June. Young plants are sometimes used for a pot herb.

Barbarea stricta Andrz.

B. vulgaris var. stricta Gray

Erect-fruited winter cress

Fields and waste places. Frequent. May-June.

Roripa sylvestris (L.) Bess.

Nasturtium sylvestre R. Br.

Creeping yellow water cress

Shores of the Susquehanna at Apalachin. Rare. Summer.

Roripa palustris (L.) Bess.

Nasturtium palustre DC.

Marsh water cress

Wet places, specially along the river. Common. Summer.

Roripa hispida (Desv.) Britton

Nasturtium palustre var. hispidum Gray

With the last but less common. Summer.

Roripa nasturtium (L.) Rusby

Nasturtium officinale R. Br.

Water cress

In brooks and small streams. Frequent. May-November.

Roripa armoracia (L.) A. S. Hitchcock

Nasturtium armoracia Fries

Horse radish

Waste places and along streams. Common. Summer.

Cardamine pennsylvanica Muhl.

Pennsylvania bitter cress

Swamps and wet places. Common. May-June.

Cardamine bulbosa (Schreb.) B. S. P.

C. rhomboidea DC.

Bulbous cress

Damp fields and thickets. Common. May-June.

Dentaria laciniata Muhl.

Cut-leaved toothwort

Moist soil in rich woods, specially along the river. Common. May.

Dentaria diphylla Michx.

Two-leaved toothwort

Rich woods and along small streams. Frequent. May.

Bursa bursa-pastoris (L.) Britton

Capsella bursa-pastoris Medic

Shepherd's purse

Fields and waste places. Abundant. March-January. Frequently used as a pot herb.

Arabis lyrata L.

Lyre-leaved rock cress

Along the river at Apalachin, growing on stony banks, upturned roots of trees and even on their trunks. Infrequent. May-August.

Arabis dentata T. & G.

Toothed rock cress

River shores. Infrequent. Barton. May-June.

Arabis hirsuta (L.) Scop.

Hairy rock cress

Thickets in stony soil. Infrequent. Apalachin and Campville. May-August.

Arabis laevigata (Muhl.) Poir.

Smooth rock cress

River banks. Frequent. May.

Arabis canadensis L.

Sickle pod

Woods and thickets, specially those along the river. Common. June-August.

Arabis glabra (L.) Bernh.

A. perfoliata Lam.

Tower mustard

Stony soil in a thicket near Apalachin. Infrequent. May-August.

Erysimum cheiranthoides L.

Treacle mustard

Fields and along streams. Common. Summer.

Hesperis matronalis L.

Dames rocket. Dames violet

Fields and thickets along the river. Common. May-August.

RESEDACEAE

Reseda odorata L.

Mignonette

Roadsides and waste places. Tioga Center.

SARRACENIACEAE

Sarracenia purpurea L.

Pitcher plant

Plentiful in peat bogs in the vicinity of Barton. June.

DROSERACEAE

Drosera rotundifolia L.

Round-leaved sundew

Bogs and specially on partly decayed logs. Mutton hill pond. Barton. July.

CRASSULACEAE

Sedum telephium L.

Live forever

In fields and along roadsides. Common. July.

Sedum acre L.

Mossy stonecrop

Occasionally escapes from cultivation. July.

Penthorum sedoides L.

Ditch stonecrop

Swamps, ditches and along streams. July-August.

SAXIFRAGACEAE

Saxifraga pennsylvanica L.

Swamp saxifrage

Swamps. Frequent. May.

Saxifraga virginiensis Michx.

Early saxifrage

Stony banks of the river and in thickets. Common. April-May.

Tiarella cordifolia L.

Coolwort. False miterwort

Rich, moist woods and shaded ravines. Common.. May.

Mitella diphylla L.

Miterwort

In rich woods with the preceding. Common. May.

Chrysoplenium americanum Schwein.

Golden saxifrage. Water carpet

Wet, shaded places. Common. May.

GROSSULARIACEAE

Ribes cynosbati L.

Wild gooseberry

Old fields, thickets and fence rows. Frequent. May.

Ribes rotundifolium Michx.

Round-leaved gooseberry

Rocky woods in the vicinity of Barton. Infrequent. May.

Ribes prostratum L'Her.

Fetid currant

Cold, wet places near Barton. Occasional. May.

Ribes floridanum L'Her.

Wild black currant

Woods and thickets. Rather common. May.

Ribes rubrum L.

Red currant

Cultivated for its fruit, but sometimes it escapes to roadsides. May.

Ribes aureum Pursh

Golden currant

This also is cultivated for its fruit and its fragrant flowers, but it occasionally escapes and grows spontaneously. May.

HAMAMELIDACEAE

Hamamelis virginiana L.

Witch hazel

A common shrub in woods and thickets and along fence rows. Autumn.

PLATANACEAE

Platanus occidentalis L.

Buttonwood. Sycamore

Along the river and streams. Common. May.

ROSACEAE

Opulaster opulifolius (L.) Kuntze

Physocarpus opulifolius Maxim

Ninebark

River banks. Common. June.

Spiraea salicifolia L.

Meadowsweet

Swamps and moist ground. Common. July.

Spiraea tomentosa L.

Hardhack. Steeple bush

Swamp east of Campville. Rare. August.

Porteranthus trifoliatus (L.) Britton

Gillenia trifoliata Moench

Indian physic. Bowman's root

Open upland woods. Frequent. June-July.

Rubus odoratus L.

Purple-flowering raspberry

Rocky woods and ravines. Frequent.

Rubus strigosus Michx.

Wild red raspberry

Neglected fields and along roadsides and fences. Common. June. It frequently flowers and fruits in late summer and autumn.

Rubus neglectus Pk.

Purple wild raspberry

In the same localities as the last, but infrequent. June. It has dark red or purple fruit, long recurved stems and much resembles R. occidentalis.

Rubus americanus (Pers.) Britton

R. triflorus Richards.

Dwarf raspberry

Swamps and low woods. Frequent. June.

Rubus nigrobaccus Bailey

R. villosus Ait.

High bush blackberry

Woods, fields and thickets. Abundant. June. The white-fruited form occurs near Barton.

Rubus villosus frondosus Bigel.

This variety occurs with the typical form.

Rubus allegheniensis Porter

Mountain blackberry

Thickets and fields. Common. June.

Rubus hispidus L.

Running swamp blackberry

Plentiful in swamps and low grounds. June.

Rubus procumbens Muhl.

R. canadensis T. & G.

Dewberry

Fields and railroad banks. Common. This is our earliest fruiting blackberry. May.

Dalibarda repens L.

Dalibarda. False violet

Moist woods. Infrequent. Apalachin. June-August.

Fragaria virginiana Duchesne

Strawberry

Fields and pastures. Common. May-June.

Fragaria vesca L.

European wood strawberry

Fields and roadsides. Frequent. May-June. An escape from cultivation.

Fragaria americana (Porter) Britton

American wood strawberry

Rocky woods. Common. May-June.

Potentilla arguta Pursh

Tall cinquefoil

Along roadsides at Barton. Common. June.

Potentilla argentea L.

Silvery cinquefoil

Dry fields and roadsides. Common. June-August.

Potentilla monspeliensis L.

P. norvegica L.

Rough cinquefoil

Fields and waste places. Common. June-September.

Potentilla canadensis L.

Fivefinger

Abundant in dry fields. May-August.

Potentilla pumila Poir.

Dwarf fivefinger

Dry fields and banks. Common. April-June.

Comarium palustre L.

Potentilla palustris Scop.

Marsh cinquefoil

Plentiful about Mutton hill pond and in Marshland swamp. June-August.

Waldsteinia fragarioides (Michx.) Tratt.

Barren strawberry

Woods and thickets in dry or moist soil. Common. May.

Geum rivale L.

Purple avens. Water avens

Swamps and low grounds. Frequent. May-June.

Geum canadense Jacq.

G. album Gmelin

White avens

Shaded places. Common. June.

Geum virginianum L.

Rough avens

Low ground. Frequent. June.

Geum strictum Ait.

Yellow avens

Fields, thickets and borders of woods. Common. June.

Agrimonia hirsuta (Muhl.) Bicknell

Tall hairy agrimony

Woods and thickets. Frequent. June-August.

Agrimonia striata Michx.

Woodland agrimony

Dry woods. Common. July-September.

Rosa blanda Ait.

Smooth rose

Rocky places. Common. June.

Rosa carolina L.

Swamp rose

Swamps and low grounds. Common. Sometimes forming dense thickets. June-July.

Rosa humilis Marsh.

Dwarf rose

Dry or rocky soil. Common. June.

Rosa humilis lucida (Ehrh.) Best

R. lucida Ehrh.

Shining wild rose

Rocky soil. Occasional. June.

Rosa rubiginosa L.

Sweetbrier

Fields and roadsides. Occasional. June-July.

Rosa cinnamomea L.

Cinnamon rose

Roadsides in the vicinity of dwellings.

POMACEAE

Sorbus americana Marsh.

Pyrus americana DC.

American mountain ash

Swamps. Rare. Barton. June-July.

Pyrus communis L.

Choke pear

Near dwellings and occasionally in fields. Fruit very astringent. May.

Malus coronaria (L.) Mill.

Pyrus coronaria L.

American crab apple

Scattered throughout our territory. Flowers rose-colored, fragrant; fruit greenish yellow, fragrant and very acid. May.

Malus malus (L.) Britton

Pyrus malus L.

Apple

Woods, thickets and fence rows. Fruit sweet or sour. Frequent. May.

Aronia arbutifolia (L.) Ell.

Pyrus arbutifolia L.f.

Red chokeberry

Marshland swamp. This is the only station observed. May.

Aronia nigra (Wild.) Britton

Pyrus arbutifolia var. melanocarpa Hook.

Black chokeberry

Swamps and bogs. Common. May-June.

Amelanchier canadensis (L.) Medic

Juneberry

Woods, thickets and fence rows. Common. May.

Amelanchier botryapium (L.) DC.

A. canadensis var. oblongifolia T. & G.

Shad bush

Woods and thickets. Common. May.

Amelanchier spicata (Lam.) DC.

Low Juneberry

Rocky banks. Infrequent. Barton and Apalachin. A shrub 2 to 3 feet high, which fruits very abundantly.

Crataegus crus-galli L.

Cockspur thorn

Woods and thickets. Frequent. May.

Crataegus punctata Jacq.

Large-fruited thorn

Thickets and fields. Common. May.

Crataegus oxyacantha L.

Hawthorn

Yards and their borders. Frequent. May.

Crataegus coccinea L.

Scarlet thorn

Woods, thickets and pastures. Common. May.

Crataegus macracantha Lodd.

C. coccinea var. macracantha Dudley

Long-spined thorn

Woods at Apalachin. Occasional. May.

Crataegus tomentosa L.

Pear thorn

Roadsides near Barton. Rare. It flowers later than our other species of thorns. June.

Prunus americana Marsh.

Wild red plum

Along streams and in moist woods, often forming thickets. Frequent. May.

Prunus cerasus L.

Sour cherry

Escaped from cultivation to roadsides and thickets. May.

Prunus avium L.

Sweet cherry

Escaped from cultivation to roadsides. May.

Prunus pennsylvanica L.f.

Wild red cherry. Pin cherry

In thickets and along fences. Common. May-June.

Prunus virginiana L.

Choke cherry

Fence rows, roadsides, banks of the river and along streams. Common. Fruit dark red or almost black, astringent. May.

Prunus serotina Ehrh.

Wild black cherry

Along fence rows and in woods and clearings. Sometimes growing to a large size. May.

Amygdalus persica L.

Prunus persica L.

Peach

Roadsides and neglected fields. April-May.

CAESALPINACEAE

Cassia nictitans L.

Sensitive pea

River shore west of Campville. August.

Gleditsia triacanthos L.

Honey locust

Abundant in hedges on the river flats at Campville. May-June.

PAPILIONACEAE

Lupinus perennis L.

Wild lupine

Banks, specially along railroads. Abundant in some places. May-June.

Medicago sativa L.

Alfalfa. Lucerne

In fields and along railroads. Frequent. Summer.

Medicago lupulina L.

Black medic. Nonesuch

Fields, waste places and specially along railroads. May-November.

Melilotus alba Desv.

White sweet clover

Waste places and along railroads. Common. June-October.

Melilotus officinalis (L.) Lam.

Yellow sweet clover

Waste places. Infrequent. Apalachin and Campville. Summer.

Trifolium agrarium L.

Yellow clover. Hop clover

Fields and roadsides. Frequent. May-September.

Trifolium procumbens L.

Low hop clover

Fields in the vicinity of Campville. Infrequent. May-September.

Trifolium incarnatum L.

Crimson clover

Meadows. Frequent. A beautiful species with conspicuous, bright crimson flowers. Often cultivated. Summer.

Trifolium arvense L.

Rabbit foot. Stone clover

Along roadsides at Apalachin and Barton. Common. Summer.

Trifolium pratense L.

Red clover

Fields and meadows. Abundant. May-October.

Trifolium hybridum L.

Alsike clover

Grass lands. Common. June-October.

Trifolium repens L.

White clover

Fields, open and waste places. Very common. May-December.

Robinia pseudacacia L.

Locust tree

Naturalized along the banks of the Susquehanna and often forming almost impenetrable thickets. June.

Robinia viscosa Vent.

Clammy locust

Roadside near Waverly. June.

Meibomia nudiflora (L.) Kuntze

Desmodium nudiflorum DC.

Naked-flowered tick trefoil

Dry woods and thickets. Common. July-August.

Meibomia grandiflora (Walt.) Kuntze

Desmodium acuminatum DC.

Pointed-leaved tick trefoil

Woods. Common. Summer.

Meibomia michauxii Vail

Prostrate tick trefoil

Dry woods in various places near Campville. July-September.

Meibomia paniculata (L.) Kuntze

Desmodium paniculatum DC.

Panicled tick trefoil

Dry soil in coppices. Common. July-September.

Meibomia dillenii (Darl.) Kuntze

Desmodium dillenii Darl.

Dillen's tick trefoil

Dry woods and fields. Common. Summer.

Meibomia canadensis (L.) Kuntze

Desmodium canadense DC.

Showy tick trefoil

Abundant along the river shores and railroad embankments. July-September.

Meibomia marylandica (L.) Kuntze

Desmodium marylandicum Boott.

Smooth, small-leaved tick trefoil

Dry soil. Frequent. July-September.

Lespedeza procumbens Michx.

Trailing bush clover

Dry soil at the base of a hill near Apalachin. The only station. August-September.

Lespedeza violacea (L.) Pers.

Bush clover

Dry banks of the river at Apalachin and Barton. Infrequent. August-September.

Lespedeza frutescens (L.) Britton

L. stuvei var. intermedia Wats.

Wandlike bush clover

Dry open coppices along the river. August-September.

Lespedeza hirta (L.) Ell.

L. polystachya Michx.

Hairy bush clover

Dry thickets. Common. August-October.

Lespedeza capitata Michx.

Round-headed bush clover

Dry banks in the river valley. Abundant. August-September.

Vicia cracca L.

Tufted vetch

Along roadsides and in dry fields. Frequent. May-August.

Vicia americana Muhl.

American vetch

Damp soil along the river. Common. May-August.

Vicia caroliniana Walt.

Carolina vetch

River valley. Common. May-July.

Lathyrus ochroleucus Hook.

Cream-colored vetchling

Infrequent at Apalachin but common in the western part of our range. May-July.

Falcata comosa (L.) Kuntze

Amphicarpa monoica Nutt.

Wild peanut

Moist thickets. Common. August-September.

Apios apios (L.) MacM.

A. tuberosa Moench

Ground nut

Damp grounds, specially along the river. Common. July-September.

GERANIACEAE

Geranium maculatum L.

Spotted crane's-bill. Alum root

Woods, thickets and moist meadows. Common. May-July.

Geranium robertianum L.

Herb robert. Red robin

Rocky woods. Infrequent. May-September.

Geranium carolinianum L.

Carolina cranesbill

River valley. Frequent. May-August.

Geranium bicknellii Britton

Bicknell's cranesbill

With the last but more common. May-September.

OXALIDACEAE

Oxalis acetosella L.

White wood sorrel

Cold, damp woods, specially under hemlocks. It bears cleistogamous flowers and yields the so called "salt of lemons." Common. June-July.

Oxalis violacea L.

Violet wood sorrel

Open woods at Campville and in alluvial soil along Apalachin creek and along the river at Apalachin. May-June.

Oxalis stricta L.

O. corniculata var. stricta Sav.

Yellow wood sorrel

Woods and fields. Common. May-October.

Oxalis cymosa Small

Tall yellow wood sorrel

Woods, cultivated and waste ground. Frequent. May-October.

LINACEAE

Linum usitatissimum L.

Flax

Along railroads. Frequent. Summer.

Linum virginianum L.

Wild yellow flax

In an old field near Campville. The only station. June.

RUTACEAE

Xanthoxylum americanum Mill.

Prickly ash

Roadsides at Apalachin and Barton. May.

SIMARUBACEAE

Ailanthus glandulosus Desf.

Tree of heaven

Introduced from China. Escaped from cultivation at Barton. It spreads freely both by seeds and suckers.

POLYGALACEAE

Polygala verticillata L.

Whorled milkwort

Fields and roadsides in dry soil. Common. June-November.

Polygala viridescens L.

P. sanguinea L.

Purple milkwort

Hilltops near Apalachin. Infrequent. June-September.

Polygala senega L.

Seneca snakeroot

Apalachin, Owego and Barton. Infrequent. June.

Polygala paucifolia Willd.

Flowering wintergreen. Fringed milkwort

Open woods and thickets. Common. May-June.

EUPHORBIACEAE

Acalypha virginica L.

Three-seeded mercury

A weed plentiful in fields. June-October.

Euphorbia maculata L.

Spotted spurge. Milk purslane

Dry, gravelly soil, specially along railroads. Very common. June-October.

Euphorbia nutans Lag.

E. preslii Guss.

Large spotted spurge

With the last but less common. May-October.

Euphorbia corollata L.

Flowering spurge

Waste places. Occasional. May-September.

Euphorbia lucida W. & R.

E. nicaeensis All.

Nicaean spurge

About villages throughout the river valley. June-July.

Euphorbia cyparissias L.

Cypress spurge

Roadsides and waste places. Common. Abundant in old cemeteries. May-September.

CALLITRICHACEAE

Callitriche palustris L.

C. verna L.

Vernal water starwort

Slow streams. Occasional. July.

ANACARDIACEAE

Rhus hirta (L.) Sudw.

R. typhina L.

Staghorn sumac

Dry or rocky soil. Common. June.

Rhus glabra L.

Smooth sumac

Dry soil. Common. June.

Rhus vernix L.

R. venenata DC.

Poison sumac

Swamps and their borders. Frequent. Plentiful about Mutton hill pond. June.

Rhus radicans L.

R. toxicodendron L.

Poison ivy

Damp thickets, along fences and river banks. Common. June.

ILICACEAE

Ilex verticillata (L.) Gray

Black alder. Winter berry

Swamps. Common. A shrub rendered conspicuous in late autumn and winter by its bright red berries.

Ilicioides mucronata (L.) Britton

Nemopanthes fasicularis Raf.

Mountain holly

Swamps and bogs. Frequent. May.

CELASTRACEAE

Euonymus europaeus L.

Spindle tree

Escaped from cultivation. Infrequent. Apalachin. June.

Celastrus scandens L.

Climbing bittersweet

Rich soil along fences and streams. An attractive plant when in fruit. Frequent. June.

STAPHYLEACEAE

Staphylea trifolia L.

American bladder nut

Abundant along the south bank of the river at Barton. Formerly found at Apalachin. May.

ACERACEAE

Acer saccharinum L.

A. dasycarpum Ehrh.

Silver maple

Along banks of streams. The principal tree along the banks of the river. Common. March-April.

Acer rubrum L.

Soft maple. Red maple

Wet or dry soil. Common. March-April.

Acer saccharum Marsh.

A. saccharinum Wang.

Hard maple. Sugar maple. Rock maple

Woods and fields. Common. April-May. This is often planted as a shade tree. Its sap is the main source of maple sugar.

Acer nigrum Michx.

A. saccharinum var. nigrum T. & G.

Black sugar maple

Less common than the preceding species, which it closely resembles, but from which it may easily be distinguished by the bark and leaves. The sap is rich in sugar. April-May.

Acer pennsylvanicum L.

Striped maple. Moosewood

Rocky woods and ravines. Common. June.

Acer spicatum Lam.

Mountain maple

Along streams, in glens and ravines. Common. June.

HIPPOCASTANACEAE

Aesculus hippocastanum L.

Horse-chestnut

Cultivated as a shade tree, and occasionally escapes from cultivation. June.

BALSAMINACEAE

Impatiens biflora Walt.

I. fulva Nutt.

Spotted touch-me-not

Damp, shaded places. Common. July-September.

Impatiens aurea Muhl.

I. pallida Nutt.

Pale touch-me-not

With the last but more abundant along the river. July-September. The mature capsules of both species burst at the slightest touch and expel the seeds with much force; hence the name "touch-me-not."

RHAMNACEAE

Rhamnus cathartica L.

Buckthorn

Planted for hedges, but it occasionally escapes to fields and fence rows. June.

Rhamnus alnifolia L'Her.

Alder-leaved buckthorn

Swamps north of Barton. Infrequent. June.

Ceanothus americanus L.

New Jersey tea. Redroot

Dry, open woods and neglected fields. Abundant. June. The leaves are said to have been used as a substitute for tea by the American troops during the Revolutionary War.

VITACEAE

Vitis aestivalis Michx.

Summer grape

Fence rows and along the river banks. Common. June. The fruit ripens early in autumn.

Vitis vulpina L.

Sweet-scented grape

Banks of the river. Frequent. May-June. Fruit ripe in August and September.

Vitis cordifolia Michx.

Frost grape. Chicken grape

Thickets and banks of streams. Common. May-June. Fruit ripe in October and November.

Parthenocissus quinquefolia (L.) Planch.

Ampelopsis quinquefolia Michx.

Virginia creeper. American ivy

Woods, thickets and fence rows. Common. July.

TILIACEAE

Tilia americana L.

Basswood. American linden

Rich soil. Common. June-July.

MALVACEAE

Malva sylvestris L.

High mallow

Waste places and along roadsides. Infrequent. Summer.

Malva rotundifolia L.

Low mallow. Cheeses

Gardens and waste places. Abundant. May-November.

Malva moschata L.

Musk mallow

Meadows and roadsides. Frequent. Summer.

Abutilon abutilon (L.) Rusby

A. avicennae Gaertn.

Velvet leaf. Indian mallow

Gardens and waste places. Common. August-October.

Hibiscus trionum L.

Flower-of-an-hour

Waste places at Barton. Adventive from Europe. August-September.

HYPERICACEAE

Hypericum ascyron L.

Great St John's wort

Banks of the river. Common. July.

Hypericum ellipticum Hook.

Pale St John's wort

Swamps and banks of streams. Common. July-August.

Hypericum perforatum L.

Common St John's wort

Abundant in fields and waste places. June-September.

Hypericum maculatum Walt.

Corymbed St John's wort

Fields, roadsides and open woods. Common. July-September.

Hypericum mutilum L.

Dwarf St John's wort

Common in damp, sterile soil. July-August.

Hypericum canadense L.

Canadian St John's wort

Wet sandy soil. Frequent. July-September.

Triadenum virginicum (L.) Raf.

Elodes campanulata Pursh

Marsh St John's wort

Swamps and along streams. Common. July-September.

CISTACEAE

Helianthemum canadense (L.) Michx.

Frostweed

Plentiful along both banks of the river at Apalachin. May-July.

VIOLACEAE

Viola palmata L.

Early blue violet

Dry, open thickets, specially along roadsides. Frequent. May. The leaves of this species are very variable, and some forms of the plant closely resemble V. atlantica Britton.

Viola obliqua Hill

V. palmata var. cucullata Gray

Hooded violet

Damp woods, meadows and swamps. May-June.

Viola papilionacea Pursh

Common blue violet

About dwellings and in grass lands. Our most common species. May-June.

Viola domestica Bicknell

Yard violet

Yards and cultivated ground. Frequent. April-May. Sometimes considered a variety of the preceding species.

Viola cucullata Ait.

Marsh blue violet

Near the mouth of Apalachin creek. Infrequent. May-June.

Viola villosa Walt.

Southern wood violet

Dry, shaded soil. The "hogback" near Apalachin, the only station for it in our range. Its leaves are closely pressed to the ground, and it much resembles the false violet, Dalibarda repens. April-May.

Viola sororia Willd.

Woolly blue violet

Fields and roadsides. Common. Plentiful along the Mutton hill road. May-June.

Viola sagittata Ait.

Arrow-leaved violet

Meadows near Apalachin. Rare. May.

Viola ovata Nutt.

Ovate-leaved violet

Fields and roadsides in dry soil. Common. April-May.

Viola rotundifolia Michx.

Round-leaved violet

Cold, damp woods. Frequent. April-May. Its leaves are small at flowering time, but they are 3-5 inches broad in summer and appressed to the ground.

Viola blanda Willd.

Sweet white violet

Swamps, wet woods and along streams. Common. April-May.

Viola blanda amoena (Le Conte) B. S. P.

V. blanda var. palustriformis Gray

Wet woods. Not common.

Viola pubescens Ait.

Hairy yellow violet

Woods in dry soil. Common. May.

Viola scabriuscula (T. & G.) Schwein.

V. pubescens var. scabriuscula T. & G.

Smooth yellow violet

Damp woods and thickets along the river. Common. April-May.

Viola canadensis L.

Canada violet

Woods. Infrequent. May-July.

Viola striata Ait.

Pale violet. Striped violet

Low woods and thickets in the river valley. Very common. May.

Viola labradorica Schrank.

V. canina var. muhlenbergii Gray

Dog violet

Moist woods and fields. Our most abundant caulescent violet. April-May.

Viola rostrata Pursh

Long-spurred violet

Moist, rocky places. Scarce. June.

THYMELEACEAE

Dirca palustris L.

Moosewood

Cold, damp woods, specially along mountain streams. Infrequent. April-May.

ONAGRACEAE

Isnardia palustris L.

Ludwigia palustris Ell.

Marsh purslane

Swamps and muddy places along brooks. Common. June-October.

Chamaenerion angustifolium (L.) Scop.

Epilobium angustifolium L.

Great willow herb. Fireweed

Wet or dry soil. Often abundant in woodlands recently overrun by fire. June-August.

Epilobium lineare Muhl.

Linear-leaved willow-herb

Swamps. Common. July-August.

Epilobium coloratum Muhl.

Purple-leaved willow-herb

Low grounds. Infrequent. July-September.

Epilobium adenocaulon Haussk.

Northern willow-herb

Moist ground. Common. July-September.

Onagra biennis (L.) Scop.

Oenothera biennis L.

Evening primrose

Roadsides and fields. Common. June-September.

Kneiffia pumila (L.) Spach

Oenothera pumila L.

Small sundrops

Fields in wet or dry soil. Common. June-July.

Kneiffia fruticosa (L.) Raimann

Oenothera fruticosa L.

Common sundrops

Dry soil. Frequent. June-July.

Gaura biennis L.

Biennial gaura

Meadows and pastures along the river. July-August.

Circaea lutetiana L.

Enchanter's nightshade

Rich, moist woods. Common. June-July.

Circaea alpina L.

Smaller enchanter's nightshade

Cold, moist woods. July-August. This plant seems to prefer the sites of old logs.

HALORAGIDACEAE

Myriophyllum spicatum L.

Spiked water milfoil

Susquehanna river in deep water. Infrequent. Summer.

ARALIACEAE

Aralia nudicaulis L.

Wild sarsaparilla

Woods and thickets. Common. May-June.

Aralia racemosa L.

Spikenard

Damp, shaded places. Frequent. July.

Aralia hispida Vent.

Bristly sarsaparilla. Dwarf elder

Swamps and openings on dry hemlock knolls. Infrequent. June.

Panax quinquefolium L.

Aralia quinquefolia D. & P.

Ginseng

Rich woods. Rare. July. Formerly more common but now fast disappearing, because of the high price paid for its roots.

Panax trifolium L.

Aralia trifolia D. & P.

Ground nut

Moist woods and thickets. Common. May.

UMBELLIFERAE

Daucus carota L.

Wild carrot

Fields and roadsides. Very common. June-September.

Angelica atropurpurea L.

Purple-stemmed angelica

Along streams. Common. June-July.

Angelica villosa (Walt.) B. S. P.

A. hirsuta Muhl.

Hairy angelica

Dry, open woods. Common. July.

Heracleum lanatum Michx.

Cow parsnip

Low ground along the river and its branches. Common. June.

Pastinaca sativa L.

Wild parsnip

Roadsides and waste places. Common. Summer.

Thaspium trifoliatum aureum (Nutt.) Britton

T. aureum Nutt.

Golden alexanders

Woods, thickets and meadows. Common. June.

Thaspium barbinode (Michx.) Nutt.

Meadow parsnip

Alluvial soil. Frequent. May-June.

Sanicula marylandica L.

Sanicle. Black snakeroot

Rich woods. Common. May-June.

Pimpinella integerrima (L.) Gray

Yellow pimpernel

Rocky soil. Common. May.

Washingtonia claytoni (Michx.) Britton

Osmorrhiza brevistylis DC.

Hairy sweet cicely

Woods. Common. May-June.

Washingtonia longistylis (Torr.) Britton

Osmorrhiza longistylis DC.

Smooth sweet cicely

Woods and shaded places in fields and by roadsides. Common. May-June.

Conium maculatum L.

Poison hemlock

Waste places. Frequent. June. The root is very poisonous.

Sium cicutaefolium Gmel.

Water parsnip

Swamps. Common. July-September.

Zizia aurea (L.) Koch

Golden meadow parsnip

Fields and meadows. Common. May.

Zizia cordata (Walt.) DC.

Heart-leaved alexanders

Open woods and thickets. Frequent. May.

Carum carui L.

Caraway

Dooryards and waste places. Common. May-June.

Cicuta maculata L.

Water hemlock. Musquash root

Swamps. Common. June-July.

Cicuta bulbifera L.

Bulb-bearing water hemlock

Swamps, ponds and along streams. Frequent. Plentiful about Mutton hill pond. July-August.

Deringa canadensis (L.) Kuntze

Cryptotaenia canadensis DC.

Honewort

Woods. Common. June.

Hydrocotyle americana L.

Marsh pennywort

Wet, shaded places. Common. June-September.

CORNACEAE

Cornus canadensis L.

Dwarf cornel. Bunchberry

Low woods and damp, shaded places. Abundant. May-June.

Cornus florida L.

Flowering dogwood

Upland woods. Common. April-May. This shrub or small tree is conspicuous in early spring by reason of its large, white, bracted flowers and again in autumn by its bright red leaves. Its wood is hard and used in the manufacture of toys.

Cornus circinata L'Her.

Round-leaved cornel

Thickets. Frequent. June.

Cornus amomum Mill.

C. sericea L.

Silky cornel. Kinnikinick

Low woods, borders of swamps and along streams. June.

Cornus stolonifera Michx.

Red osier

Borders of swamps. Common. June.

Cornus candidissima Marsh.

C. paniculata L'Her.

Panicled cornel

Thickets and fence rows. Common. June.

Cornus alternifolia L. f.

Alternate-leaved cornel

Open woods. Common. June.

Nyssa sylvatica Marsh.

Pepperidge. Sour gum

Moist soil, specially along the borders of swamps. Frequent. May. This tree is conspicuous in autumn by its bright crimson leaves. Its wood is soft but hard to split, and at an early day was much used for ox yokes.

PYROLACEAE

Pyrola rotundifolia L.

Round-leaved wintergreen

Rich woods. Common. July.

Pyrola chlorantha Sw.

Greenish-flowered wintergreen

Pyrola elliptica Nutt.

Shin leaf

Rich woods. Common. July.

Pyrola secunda L.

One-sided wintergreen

Woods and thickets. Common. July.

Chimaphila maculata L.

Spotted wintergreen

Dry woods west of Barton. Rare. June-July.

Chimaphila umbellata (L.) Nutt.

Prince's pine. Pipsissewa

Dry, rich woods. Common. June-July.

MONOTROPACEAE

Monotropa uniflora L.

Indian pipe

Moist, rich woods. Frequent. July.

ERICACEAE

Azalea nudiflora L.

Rhododendron nudiflorum Torr.

Azalea. Mayflower

Woods and thickets. Common. May.

Azalea canescens Michx.

Mountain azalea

Brush lots and borders of swamps. Common. May.

Kalmia latifolia L.

Mountain laurel

Rocky woods, specially on the sides of rocky ravines. Near Campville, in the Delaware, Lackawanna and Western narrows near Owego, and on Watch hill. June.

Kalmia glauca Ait.

Pale laurel

Bogs north of Barton. Rare. June.

Andromeda polifolia L.

Wild rosemary. Moorwort

Bogs north of Barton. Infrequent. May.

Xolisma ligustrina (L.) Britton

Andromeda ligustrina Muhl.

Andromeda

Wet or dry soil but more frequently in swamps. Common. June.

Chamaedaphne calyculata (L.) Moench

Cassandra calyculata Don

Leather leaf

Bogs and swamps, where it forms low, dense thickets. Abundant. May.

Epigaea repens L.

Trailing arbutus. Mayflower

Woods and bushy fields, preferring damp situations. April-May.

Gaultheria procumbens L.

Wintergreen

Woods and thickets in soil wet or dry. Common. June-July.

VACCINIACEAE

Gaylussacia resinosa (Ait.) T. & G.

Black huckleberry

Woods and thickets, preferring rocky soil. Common. May.

Vaccinium corymbosum L.

Swamp blueberry

Swamps and their borders. Common. May.

Vaccinium atrococcum (Gray) Heller

V. corymbosum var. atrococcum Gray

Black blueberry

Swamps. Frequent. May.

Vaccinium pennsylvanicum Lam.

Dwarf blueberry

Dry, rocky or sandy soil. Common. May.

Vaccinium nigrum (Wood) Britton

V. pennsylvanicum var. nigrum Wood

Low black blueberry

Dry, rocky soil. Frequent. May.

Vaccinium vacillans Kalm

Low blueberry

Dry soil. Common. May.

Vaccinium stamineum L.

Deerberry

Dry thickets, specially on hillsides. Common. May. The Canada blueberry, V. canadense, which is common in nearly all elevated swamps, is apparently wanting in our limits.

Chiogenes hispidula (L.) T. & G.

C. serpyllifolia Salisb.

Creeping snowberry

Bogs and cold wet woods north of Barton. May. This plant has the odor and flavor of birch. Its fruit is white.

Oxycoccus oxycoccus (L.) MacM.

Vaccinium oxycoccus L.

Small cranberry

Bogs north of Barton. June.

Oxycoccus macrocarpus (Ait.) Pers.

Vaccinium macrocarpon Ait.

Large cranberry

Mutton hill pond and bogs near Barton. June. More common than the preceding species.

PRIMULACEAE

Lysimachia quadrifolia L.

Whorled loosestrife

Thickets and neglected fields. Common. June-July.

Lysimachia terrestris (L.) B. S. P.

L. stricta Ait.

Bulb-bearing loosestrife

Swamps, moist thickets and the river shores. Common. July-September.

Lysimachia nummularia L.

Moneywort

Lawns and roadsides near houses. Common. June-August.

Steironema ciliatum (L.) Raf.

Fringed loosestrife

Moist thickets. Common. June-July.

Naumbergia thyrsiflora (L.) Duby

Lysimachia thyrsiflora L.

Tufted loosestrife

Swamps north of Barton. Infrequent. May-June.

Trientalis americana Pursh

Star flower

Damp woods. Common. May.

OLEACEAE

Syringa vulgaris L.

Lilac

Roadsides, specially near deserted dwellings, occasionally in fields. Common. May.

Fraxinus americana L.

White ash

Common in rich woods. May.

Fraxinus pennsylvanica Marsh.

F. pubescens Lam.

Red ash

Moist soil. Frequent. May.

Fraxinus nigra Marsh.

F. sambucifolia Lam.

Black ash

Swamps. Common. May.

Ligustrum vulgare L.

Privet

Escaped from cultivation to roadsides in the vicinity of Barton. July.

GENTIANACEAE

Gentiana crinita Froel.

Fringed gentian

Plentiful in a moist field near Apalachin. This is its only known station in our limits. Autumn.

Gentiana quinquefolia L.

G. quinqueflora Lam.

Stiff gentian. Ague weed

Neglected fields. Common. September.

Gentiana andrewsii Griseb.

Closed gentian

Moist soil, specially along streams. Frequent. August-September.

MENYANTHACEAE

Menyanthes trifoliata L.

Buck bean. Bog bean

Bogs. Mutton hill pond. Infrequent. May-June.

APOCYNACEAE

Vinca minor L.

Myrtle. Periwinkle

Dooryards and specially abundant about old graveyards. May.

Apocynum androsaemifolium L.

Spreading dogbane

Fields, thickets and fence rows. Common. July.

Apocynum cannabinum L.

Indian hemp

Abundant on gravelly shores of the river. July-August.

ASCLEPIADACEAE

Asclepias tuberosa L.

Butterfly weed. Pleurisy root

Dry fields and along railroads. Frequent. August. Abundant along the Erie railroad east of Campville.

Asclepias incarnata L.

Swamp milkweed

Swamps and wet places. Common. July-August.

Asclepias exaltata (L.) Muhl.

A. phytolaccoides Pursh

Tall milkweed

Open woodlands. Common. July.

Asclepias quadrifolia Jacq.

Four-leaved milkweed

Woods and thickets. Common. June-July.

Asclepias syriaca L.

A. cornuti Dec.

Common milkweed. Silkweed

Fields and waste places. Very common. July.

CONVOLVULACEAE

Ipomoea purpurea (L.) Roth

Morning-glory

Waste places. Frequent. Escapes from cultivation.

Convolvulus sepium L.

Hedge bindweed

Thickets and fields. Abundant on the river flats. Common. Summer.

Convolvulus spithamaeus L.

Upright bindweed

Rocky banks. Common. June.

Convolvulus arvensis L.

Field bindweed

Along the railroad at Apalachin. Rare. July-August.

CUSCUTACEAE

Cuscuta coryli Engelm.

C. inflexa Engelm.

Hazel dodder

River flats at Campville. Rare. August. It grows on hazel bushes.

Cuscuta gronovii Willd.

Dodder. Love vine

Damp, shaded grounds, parasitic on herbs and low shrubs. Very common. August.

POLEMONIACEAE

Phlox paniculata L.

Garden phlox

Cultivated for its flowers, but it frequently escapes from gardens. July.

Phlox maculata L.

Wild sweet william

Cultivated for its flowers, but it occasionally escapes from gardens. June-July.

Phlox divaricata L.

Wild blue phlox

Moist woods along streams, specially along Apalachin creek. Common. May.

Phlox subulata L.

Ground pink. Moss pink

Common on hillsides from Smithboro to the western limit of our range. April-May.

Polemonium reptans L.

Greek valerian. Jacob's ladder

Low woods along the river at Barton. Scarce in the eastern part of our range. May.

HYDROPHYLLACEAE

Hydrophyllum virginicum L.

Virginia waterleaf

Woods and shady places. Common. June.

Hydrophyllum canadense L.

Broad-leaved waterleaf

Plentiful in bottom woods near Barton but not observed elsewhere in our limits.

BORAGINACEAE

Cynoglossum officinale L.

Hound's-tongue

Fields and waste places. Frequent. June-July.

Cynoglossum virginicum L.

Wild comfrey

Open woods. Infrequent. May.

Lappula virginiana (L.) Greene

Echinospermum virginicum Lehm.

Beggar's lice. Virginia stickseed

Woods and thickets. Common. Summer.

Mertensia virginica (L.) DC.

Lungwort

Banks of the river and along streams. Abundant in some places. May.

Myosotis palustris (L.) Lam.

Forget-me-not

Occasionally escapes from cultivation. May-June.

Myosotis laxa Lehm.

Small forget-me-not

Streams and muddy places. Common. June-July.

Lithospermum arvense L.

Corn gromwell

Along railroads. Barton and Campville. Infrequent. June-July.

Symphytum officinale L.

Comfrey

Fields and waste places. Occasional. June.

Lycopsis arvensis L.

Small bugloss

Near Tioga Center. Rare. June-August.

Echium vulgare L.

Blueweed. Viper's bugloss

Along railroads and in waste places at Owego. Common. July.

VERBENACEAE

Verbena urticifolia L.

White vervain

Fields, woods and waste places. Common. July-August.

Verbena hastata L.

Blue vervain

Fields and waste places, specially along streams. Common. July-August.

LABIATAE

Teucrium canadense L.

Wood sage. Germander

Common on the river flats. July-August.

Trichostema dichotomum L.

Blue curls

Plentiful on the river flats opposite Apalachin. August-September.

Scutellaria lateriflora L.

Mad-dog skullcap

Swamps and wet places. Common. August.

Scutellaria galericulata L.

Marsh skullcap

Marshes, borders of ponds and along streams. Common. July-August.

Agastache scrophulariaefolia (Willd.) Kuntze

Lophanthus scrophulariaefolius Benth.

Giant hyssop

Thickets along the river banks. Infrequent. August-September.

Nepeta cataria L.

Catnip. Catmint

Waste places. Common. July-November.

Glecoma hederacea L.

Nepeta glechoma Benth.

Ground ivy. Gill-over-the-ground

Woods, thickets, swamps and waste places. Common. April-May.

Prunella vulgaris L.

Brunella vulgaris L.

Self-heal. Heal-all

Fields, woods and pastures. Very common. June-October.

Galeopsis tetrahit L.

Hemp nettle

Waste places. Common. July-August.

Leonurus cardiaca L.

Motherwort

Waste places about dwellings. Common. July-August.

Lamium amplexicaule L.

Henbit. Dead nettle

Thickets, waste places and cultivated ground. Infrequent. Apalachin and Barton. May-September.

Lamium maculatum L.

Spotted dead nettle

Roadsides at Barton. June-September.

Stachys aspera Michx.

Rough hedge nettle

Low grounds. Not common. July-August.

Monarda didyma L.

Oswego tea. American bee balm

Moist soil, specially along the river and creeks. Common. July-August.

Monarda clinopodia L.

Basil balm

Plentiful on the Marshland farm, in thickets along the river and in Mutton hill pond woods. July.

Monarda fistulosa L.

Wild bergamot

Dry soil in neglected fields. Common. July-August.

Monarda media Willd.

M. fistulosa var. rubra Gray

Purple bergamot

Moist thickets at Barton. Rare. June-August.

Blephilia ciliata (L.) Raf.

Downy blephilia

Thickets near Apalachin. Rare. July-August.

Hedeoma pulegioides (L.) Pers.

American pennyroyal

Dry fields, specially on hills. Abundant. August.

Clinopodium vulgare L.

Calamintha clinopodium Benth.

Wild basil

Woods, fields and thickets. Common. Summer.

Koellia flexuosa (Walt.) MacM.

Pycnanthemum linifolium Pursh

Narrow-leaved mountain mint

Fields near Campville. August.

Koellia virginiana (L.) MacM.

Pycnanthemum lanceolatum Pursh

Virginia mountain mint

Fields near Campville and Barton. August.

Koellia incana (L.) Kuntze

Pycnanthemum incanum Michx.

Hoary mountain mint

Thickets and dry hillsides. More common than the two preceding species. September-October.

Thymus serpyllum L.

Creeping thyme

Old graveyards. Naturalized. Summer.

Lycopus virginicus L.

Bugleweed

Wet soil. Common. August.

Lycopus americanus Muhl.

L. sinuatus Ell.

Cut-leaved water hoarhound

Damp grounds. Common. July-September.

Mentha spicata L.

M. viridis L.

Spearmint

Wet ground and along streams. Common. August.

Mentha piperita L.

Peppermint

Wet soil and along streams. Common. August.

Mentha citrata Ehrh.

Bergamot mint

Roadsides. Occasional. August.

Mentha canadensis L.

American wild mint

Low ground. Common. August-September.

Collinsonia canadensis L.

Horse balm. Richweed. Stoneroot

Moist woods and thickets. Common. August. Its flowers have an odor like that of lemons.

SOLANACEAE

Physalodes physalodes (L.) Britton

Nicandra physalodes Gaertn.

Apple of Peru

Waste places, specially about gardens. August-September.

Physalis philadelphica Lam.

Philadelphia ground cherry

Waste places at Apalachin. Rare. August.

Physalis heterophylla Nees

P. virginiana Mill.

Clammy ground cherry

Cultivated grounds and along railroads. Common. August-September.

Solanum nigrum L.

Black nightshade

Waste ground at Barton. Rare. August-September.

Solanum carolinense L.

Horse nettle

Plentiful in cultivated fields near Apalachin. June-September.

Solanum dulcamara L.

Nightshade. Bittersweet

Waste places, along streams and in swamps, often growing in water. Common. June-September.

Lycium vulgare (Ait.) Dunal

Matrimony vine

About old, deserted dwellings. Frequent. June-August.

Datura stramonium L.

Thorn apple. Jimson weed

Waste grounds. Infrequent. August.

SCROPHULARIACEAE

Verbascum thapsus L.

Great mullen

Dry soil in fields. Common. July.

Verbascum blattaria L.

Moth mullen

Pastures, fields and waysides. Frequent. July-October.

Cymbalaria cymbalaria (L.) Wettst.

Linaria cymbalaria Mill.

Kenilworth ivy

Introduced from Europe but well established at Owego and growing on stone abutments facing the river. June-August.

Linaria linaria (L.) Karst.

L. vulgaris Mill.

Yellow toadflax. Butter and eggs

Fields and waste places. Abundant. June-October. A troublesome weed.

Scrophularia marylandica L.

S. nodosa var. marylandica Gray

Figwort

Fields, thickets and roadsides. Frequent. August.

Scrophularia leporella Bickn.

Hare figwort

With the preceding species but more common. Abundant along the river. June-July.

Chelone glabra L.

Snakehead. Balmony

Swamps and along streams. Common. August-September.

Pentstemon hirsutus (L.) Willd.

P. pubescens Soland.

Hairy beard-tongue

Roadsides and banks in dry soil. Common. June.

Pentstemon digitalis (Sweet) Nutt.

P. laevigatus var. digitalis Gray

Foxglove beard-tongue

In a meadow at Apalachin. Rare. June.

Mimulus ringens L.

Monkey flower

Wet soil, specially along streams. Common. July-September.

Gratiola virginiana L.

Clammy hedge hyssop

Muddy places. Common. June-September.

Ilysanthes gratioloides (L.) Benth.

I. riparia Raf.

False pimpernel

Wet soil on the shores of streams and ponds. Common. August.

Veronica anagallis-aquatica L.

V. anagallis L.

Water speedwell

Plentiful in a ditch opposite Apalachin. June-August.

Veronica americana Schwein.

American brooklime

Swamps, ditches and brooks. Common. May-August.

Veronica scutellata L.

Marsh speedwell

Swamps. Common. May-September.

Veronica officinalis L.

Common speedwell

Dry soil in fields and woods. Common. June-August.

Veronica serpyllifolia L.

Thyme-leaved speedwell

Fields and thickets. Very common. May-July.

Veronica peregrina L.

Purslane speedwell

An abundant weed in cultivated ground. June-September.

Veronica arvensis L.

Corn speedwell

Woods, fields and cultivated ground. Common. May-August.

Veronica byzantina (S. & S.) B. S. P.

V. buxbaumii Tenore

Byzantine speedwell

Waste places and gardens. Frequent. May-September.

Veronica spicata L.

Spiked speedwell

Established in meadow lands near Apalachin. August.

Leptandra virginica (L.) Nutt.

Veronica virginica L.

Culver's root

River flats. Common. June-August.

Dasystoma pedicularia (L.) Benth.

Gerardia pedicularia L.

Fern-leaved false foxglove

Dry soil in woods and thickets. Frequent. August.

Dasystoma flava (L.) Wood

Gerardia flava L.

Downy false foxglove

Dry, open woods and thickets. Common. July-August.

Dasystoma virginica (L.) Britton

Gerardia quercifolia Pursh

Smooth false foxglove

Dry soil in woods and thickets. Frequent. July-August. This and the two preceding species are sometimes found growing together.

Gerardia tenuifolia Vahl

Slender gerardia

Roadsides and coppices on hillsides. Frequent. August-September.

Pedicularis canadensis L.

Wood betony. Lousewort

Dry, open thickets. Common. May-June.

Melampyrum lineare Lam.

M. americanum Michx.

Narrow-leaved cowwheat

Dry woods and thickets. Common. June-August.

LENTIBULARIACEAE

Utricularia vulgaris L.

Common Bladderwort

Still or sluggish waters. Common. July.

OROBANCHACEAE

Thalesia uniflora (L.) Britton

Aphyllon uniflorum Gray

Naked broom rape

Dry thickets near Apalachin. May.

Leptamnium virginianum (L.) Raf.

Epiphegus virginiana Bart.

Beech drops

Under beech trees. Frequent. September-October.

BIGNONIACEAE

Catalpa catalpa (L.) Karst.

C. bignonioides Walt.

Catalpa. Indian bean

Planted as a shade tree, but sometimes becomes spontaneous. July.

ACANTHACEAE

Dianthera americana L.

Water willow

Common in the river from Smithboro westward, but not found in the eastern part of our range. July-August.

PHRYMACEAE

Phryma leptostachya L.

Lopseed

Woods and thickets. Frequent. July-August.

PLANTAGINACEAE

Plantago major L.

Common plantain

Waste places. Common. Summer.

Plantago rugelii Dec.

Rugel's plantain

Waste places. Common. Summer.

Plantago lanceolata L.

English plantain. Ribgrass

Waste places and grass lands. Very common. May-October.

Plantago aristata Michx.

Recently introduced into a grain field and now spreading rapidly. June-September.

Plantago virginica L.

Dwarf plantain

Meadows 1 mile south of Barton. Plentiful. May-June.

RUBIACEAE

Houstonia coerulea L.

Bluets. Innocence

Meadows and pastures, specially in moist soil. Common. July.

Galium trifidum L.

Small bedstraw

Bogs and cold swamps. Frequent. Summer.

CAPRIFOLIACEAE

Sambucus canadensis Michx.

Sweet elder

Roadsides, fence rows and bottom lands. Common. July.

Sambucus pubens Michx.

S. racemosa L.

Red-berried elder

Moist soil in rocky woods. Common. May.

Viburnum alnifolium Marsh.

V. lantanoides Michx.

Hobblebush

Low woods. Frequent. May.

Viburnum opulus L.

High bush cranberry. Cramp bark

Swamps near Barton. Infrequent. June.

Viburnum acerifolium L.

Maple-leaved arrowwood. Dockmackie

Dry, rocky woods. Common. June.

Viburnum pubescens (Ait.) Pursh

Downy-leaved arrowwood

Rocky woods. Common. June.

Viburnum dentatum L.

Arrowwood

Borders of swamps. Common. June.

Viburnum cassinoides L.

Withe-rod. Appalachian tea

Swamps and low ground. Common. June.

Viburnum lentago L.

Nannyberry. Sheepberry

Low ground. Common. May.

Triosteum perfoliatum L.

Feverwort. Horse gentian

Borders of woods, specially along the river. Frequent. June.

Linnaea borealis L.

Twin flower

Damp, shrubby field near Apalachin. Rare. June.

Symphoricarpus racemosus Michx.

Snowberry

Plentiful along the river banks at Barton, also frequent by roadsides where it has escaped from cultivation. June-August.

Lonicera dioica L.

L. glauca Hill

Glaucous honeysuckle

Dry soil in thickets and along fences. Frequent. June.

Lonicera ciliata Muhl.

Fly honeysuckle

Moist woods. Common. May.

Lonicera tatarica L.

Tartarian bush honeysuckle

Roadsides. Escaped from cultivation. May.

Diervilla diervilla (L.) MacM.

D. trifida Moench

Bush honeysuckle

Dry, rocky, woodland roadsides and fence rows. Common. June.

VALERIANACEAE

Valerianella chenopodifolia (Pursh) DC.

Goosefoot corn salad

Moist meadows along the river. Frequent. June-July.

Valerianella radiata (L.) Dufr.

Beaked corn salad

Bottom land at Barton. Frequent. June-July.

DIPSACACEAE

Dipsacus sylvestris Huds.

Card teasel

Waste places. Common. July-August.

CUCURBITACEAE

Micrampelis lobata (Michx.) Greene

Echinocystis lobata T. & G.

Wild balsam apple

River banks and waste places. Common. July-August.

Sicyos angulatas L.

Star cucumber

River banks and waste places. Common. July-September.

CAMPANULACEAE

Campanula rotundifolia L.

Harebell

Rocks near Barton. Rare. July-August.

Campanula rapunculoides L.

European bellflower

Roadsides and about old dwellings. Common. July-September.

Campanula aparinoides Pursh

Marsh bellflower

Wet, grassy places. Common. July-August.

Legouzia perfoliata (L.) Britton

Specularia perfoliata A. DC.

Venus looking-glass

Fields, roadsides and in cultivated soil. Common. June.

Lobelia cardinalis L.

Cardinal flower

Shores of streams. Common. July-August.

Lobelia syphilitica L.

Great lobelia

Wet meadows and borders of swamps. Frequent. August.

Lobelia spicata Lam.

Spiked lobelia

Meadows and pastures. Common. July.

Lobelia inflata L.

Indian tobacco

Fields and thickets. Common. July.

CICHORIACEAE

Cichorium intybus L.

Chicory

Fields and roadsides. Frequent. August.

Tragopogon pratensis L.

Goat's beard

Frequent along railroads. Summer.

Tragopogon porrifolius L.

Oyster plant. Salsify

Escapes from cultivation. Summer.

Taraxacum taraxacum (L.) Karst.

T. officinale Weber

Dandelion

Fields and waste places. Very common. April-December.

Taraxacum erythrospermum Andrz.

Red-seeded dandelion

Fields and waste places. Common. Easily distinguished from the last by its brownish red seeds.

Sonchus oleraceus L.

Annual sow thistle

Waste places, specially along railroads. Common. June-October.

Sonchus asper (L.) All.

Spiny sow thistle

With the last. Common. June-October.

Lactuca virosa L.

Prickly lettuce

Waste places. Common. August-September. A very troublesome weed, which is fast spreading.

Lactuca canadensis L.

Tall lettuce

Thickets and fence rows. Common. July-September.

Lactuca villosa Jacq.

L. acuminata Gray

Blue lettuce

Thickets. Frequent. August.

Lactuca spicata (Lam.) Hitch.

L. leucophaea Gray

Tall blue lettuce

Moist soil. Common. August-September.

Hieracium aurantiacum L.

Orange hawkweed. Paint brush

Fields. It often forms dense patches. Common. June-September.

Hieracium praealtum Vill.

King devil

In a meadow near Apalachin. Rare. June-August.

Hieracium venosum L.

Rattlesnake weed

Dry woods and thickets. Common. June-August.

Hieracium canadense Michx.

Canada hawkweed

Dry woods and thickets. Frequent. August.

Hieracium paniculatum L.

Panicled hawkweed

Dry, open woods. Common. August.

Hieracium scabrum Michx.

Rough hawkweed

Dry soil in woods and clearings. Common. August.

Nabalus altissimus (L.) Hook.

Prenanthes altissima L.

Tall white lettuce

Woods and thickets. Common. August-October.

Nabalus albus (L.) Hook.

Prenanthes alba L.

White lettuce. Rattlesnake root

Thickets and borders of woods. Common. August-September.

Nabalus serpentarius (Pursh) Hook.

Prenanthes serpentaria Pursh

Lion's foot. Gall-of-the-earth

Thickets and open woods. Common. August-September.

AMBROSIACEAE

Ambrosia trifida L.

Great ragweed

Abundant along the river banks. August-September.

Ambrosia trifida integrifolia (Muhl.) T. & G.

With the type. Frequent.

Ambrosia artemisiaefolia L.

Ragweed. Hogweed

Cultivated soil and waste places. A very common weed. August-September.

Xanthium canadense Mill.

American cocklebur

River banks, along streams and in waste places. Common. August-September.

Xanthium strumarium L.

Bur weed

Waste places. Occasional. August-September.

COMPOSITAE

Eupatorium purpureum L.

Trumpetweed. Gravelroot

Moist soil. Common. August-September.

Eupatorium purpureum falcatum (Michx.) Britton

With the type, specially along the river.

Eupatorium perfoliatum L.

Boneset. Thoroughwort

Wet places. Common. August-September.

Eupatorium perfoliatum truncatum (Muhl.) Gray

Vicinity of Apalachin. Infrequent.

Eupatorium ageratoides L.f.

White snakeroot

Woods and thickets. Common. Occasional in shaded places near dwellings. August-September.

Solidago squarrosa Muhl.

Stout ragged goldenrod

Dry, rocky soil on hilltops and along roadsides. Common. September.

Solidago caesia L.

Blue-stemmed goldenrod

Woods and thickets. Common. August-September.

Solidago caesia axillaris (Pursh) Gray

Woods and thickets. Common.

Solidago flexicaulis L.

S. latifolia L.

Broad-leaved goldenrod

Rich, moist woods and thickets. Common. August-September.

Solidago bicolor L.

White goldenrod

Thickets and roadsides. Common. August-September.

Solidago hispida Muhl.

S. bicolor var. concolor T. & G.

Hairy goldenrod

Dry soil in thickets. Frequent. August-September.

Solidago rugosa Mill.

Rough goldenrod

Fields, fence rows and roadsides. Very common. August-September.

Solidago patula Muhl.

Rough-leaved goldenrod

Swamps at Apalachin and Barton. Infrequent. September.

Solidago ulmifolia Muhl.

Elm-leaved goldenrod

Woods, coppices and dry slopes. Infrequent. August-September.

Solidago juncea Ait.

Early goldenrod

Dry, rocky soil of fields and banks. Common. July. This is our earliest blooming species and is sometimes found in flower late in June.

Solidago arguta Ait.

Cut-leaved goldenrod

Moist thickets. Frequent. July-September.

Solidago serotina Ait.

Smooth goldenrod

Moist soil. Common. August-September.

Solidago serotina gigantea (Ait.) Gray

With the type and nearly as common. August-September.

Solidago canadensis L.

Canada goldenrod

Old fields, fence rows and roadsides. Abundant. August-September.

Solidago nemoralis Ait.

Field goldenrod

Poor, rocky soil in old fields. Very common. August-September.

Euthamia graminifolia (L.) Nutt.

Solidago lanceolata L.

Narrow-leaved goldenrod

Fields and roadsides. Very common. August.

Sericocarpus asteroides (L.) B. S. P.

S. conyzoides Nees

White-topped aster

Dry woods. Frequent. August.

Aster divaricatus L.

A. corymbosus Ait.

White wood aster

Open woodland and thickets. Common. September.

Aster curvescens Burgess

Dome-topped aster

Moist, shaded soil. Common. September.

Aster macrophyllus L.

Large-leaved aster

Woods and thickets. Common. August. A species having many different forms.

Aster ianthinus Burgess

Violet wood aster

Wooded banks and paths. Frequent. August-September.

Aster cordifolius L.

Common blue wood aster

Open woods, fence rows, thickets and specially along woodland roads. Common. September-November.

Aster cordifolius polycephalus Porter

With the type. Occasional.

Aster lowrieanus Porter

Lowrie's aster

Woods. Common. September-October.

Aster lowrieanus lancifolius Porter

With the type.

Aster undulatus L.

Wavy-leaf aster

Dry soil. Common. September.

Aster undulatus loriformis Burgess

With the type. Common. September.

Aster patens Ait.

Late purple aster

Dry, open places. Frequent. September.

Aster novae-angliae L.

New England aster

Fields and fence rows. Common. August-September. A splendid species.

Aster puniceus L.

Purple-stem aster

Swamps and wet places. Common. September.

Aster puniceus firmus (Nees) T. & G.

Aster puniceus var. laevicaulis Gray

With the type. Frequent. September.

Aster prenanthoides Muhl.

Crooked-stem aster

Moist soil. Common. September-October.

Aster laevis L.

Smooth aster

Borders of woods and thickets. Common. September. A beautiful species.

Aster acuminatus Michx.

Mountain aster

Moist woods. Common. August-September.

Aster paniculatus Lam.

Tall white aster

Moist soil. Common. September.

Aster ericoides L.

White heath aster

Dry soil. Common. September-November.

Aster lateriflorus (L.) Britton

A. diffusus Ait.

Starved aster

Fields, roadsides and thickets. Common. September.

Aster vimineus Lam.

Small white aster

Borders of thickets. Frequent. September.

Erigeron pulchellus Michx.

E. bellidifolius Muhl.

Robin's plantain

Banks. Common. May.

Erigeron philadelphicus L.

Philadelphia fleabane

Moist, grassy fields and woods. Common. May-June.

Erigeron annuus (L.) Pers.

Sweet scabious

Fields and roadsides. Common. May-October.

Erigeron ramosus (Walt.) B. S. P.

E. strigosus Muhl.

Daisy fleabane

A common weed in meadows. June-September.

Leptilon canadense (L.) Britton

Erigeron canadensis L.

Canada fleabane. Horseweed

A very common weed in fields and waste places. July-September.

Doellingeria umbellata (Mill.) Nees

Aster umbellatus Mill.

Tall flat-top white aster

Moist soil near Apalachin. August.

Doellingeria infirma (Michx.) Greene

Aster infirmus Michx.

Cornel-leaved aster

Dry, rocky soil in woods and thickets. Frequent. August-September.

Antennaria neglecta Greene

Field cat's-foot

Pastures. Common. April-May.

Antennaria plantaginifolia (L.) Richards.

Plantain-leaf everlasting

Woods and old fields. Common. April-May.

Anaphalis margaritacea (L.) B. & H.

Pearly everlasting

Old fields. Common. August.

Gnaphalium obtusifolium L.

G. polycephalum Michx.

White balsam

Dry, open places. Common. August.

Gnaphalium decurrens Ives

Clammy everlasting

Dry, open places. Common. August.

Gnaphalium uliginosum L.

Low cudweed

Damp soil, specially along roadsides. Common. August.

Inula helenium L.

Elecampane

Fields, roadsides and along streams in woods. Common. August.

Polymnia canadensis L.

Small-flowered leafcup

"Hog back" near Apalachin. Rare. August.

Heliopsis helianthoides (L.) B. S. P.

H. laevis Pers.

Oxeye

Common on the banks of the river and along streams. August.

Rudbeckia hirta L.

Black-eyed susan. Yellow daisy

Meadows and pastures. Common. June-August.

Rudbeckia laciniata L.

Tall coneflower

Damp soil in thickets. Common. July-August.

Helianthus annuus L.

Common sunflower

Waste places. Frequent. August.

Helianthus divaricatus L.

Rough sunflower

Dry thickets. Common. July-August.

Helianthus decapetalus L.

Thin-leaved sunflower

Along the river and in moist woods. Common. August-September.

Helianthus strumosus L.

Wood sunflower

Plentiful in a thicket near Apalachin. August-September.

Helianthus tuberosus L.

Jerusalem artichoke

River banks and waste places. Common. September. Apparently indigenous in the river valley.

Bidens laevis (L.) B. S. P.

B. chrysanthemoides Michx.

Larger bur marigold

Swamps, ditches and wet meadows. Common. August-September.

Bidens cernua L.

Smaller bur marigold

Wet soil. Common. August-September.

Bidens connata Muhl.

Swamp beggar ticks

Swamps and moist soil. Common. August-September.

Bidens frondosa L.

Beggar ticks. Stick-tight

Damp soil in fields. Very common. August-September.

Galinsoga parviflora Cav.

Galinsoga

Dooryards and waste places at Owego and Waverly. Plentiful. August-September.

Helenium autumnale L.

Sneezeweed

Banks of the river, along streams and in swamps. Common. September-October.

Achillea millefolium L.

Yarrow. Milfoil

Fields, pastures and roadsides. Common. June-September.

Anthemis cotula L.

Mayweed

Fields, waste places and roadsides. Common. June-September.

Anthemis arvensis L.

Corn camomile

Fields, specially on the river flats. Common. May-June.

Chrysanthemum leucanthemum L.

White daisy

Meadows and fields. Abundant. May-August.

Chrysanthemum parthenium (L.) Pers.

Common feverfew

Frequent in waste places at Apalachin. Summer. Escapes from cultivation in gardens.

Tanacetum vulgare L.

Tansy

Fields, roadsides and along streams. Common. August-September.

Artemisia absinthium L.

Wormwood

Waste places at Barton. July-September.

Artemisia vulgaris L.

Common mugwort

Waste places at Barton. July-September.

Tussilago farfara L.

Coltsfoot

Moist soil by roadsides. Infrequent. April-May.

Erechtites hieracifolia (L.) Raf.

Fireweed

Woodland and thickets, specially in recent clearings and burnt districts. Common. August-September.

Synosma suaveolens (L.) Raf.

Cacalia suaveolens L.

Sweet-scented Indian plantain

Alluvial soil and woods along the river. Frequent. September.

Senecio aureus L.

Golden ragwort. Liferoot

Swamps, wet meadows and along streams. Common. May-June.

Arctium lappa L.

Burdock

Waste places. Frequent. July-September.

Arctium minus Schk.

Common burdock

Waste places, specially about dwellings. Common. July-October.

Carduus lanceolatus L.

Cnicus lanceolatus Hoffm.

Common bur thistle

Fields and waste places. Common. July-October.

Carduus discolor (Muhl.) Nutt.

Cnicus altissimus var. discolor Gray

Field thistle

Plentiful in fields along the river. July-October.

Carduus odoratus (Muhl.) Porter

Cnicus pumilus Torr.

Pasture thistle. Fragrant thistle

Fields. Frequent. July-August.

Carduus muticus (Michx.) Pers.

Cnicus muticus Pursh

Swamp thistle

Swamps and along streams. Common. August.

Carduus arvensis (L.) Robs.

Cnicus arvensis Hoffm.

Canada thistle

Abundant in fields and waste places. July-September.

EXPLANATION OF PLATES

PLATE M

Hygrophorus subrufescens Pk.

Reddish Hygrophorus

1, 2 Two plants with convex cap
3, 4 Two plants with margin of cap curved upward
5 Vertical section of the upper part of a mature plant
6 Four spores × 400

Collybia uniformis Pk.

Uniform Collybia

7 Cluster of four plants growing from the upper surface of a piece of wood, two of them young, two mature
8 Cluster of three mature plants growing from the lateral surface of a piece of wood
9-11 Three mature plants, one with curved stem
12 Vertical section of the upper part of a mature plant with fully expanded cap
13 Transverse section of a stem
14 Vertical section of the upper part of a plant with convex cap
15 Transverse section of a compressed stem
16 Four spores × 400

Mycena rugosoides Pk.

WRINKLED MYCENA

17-19 Three plants with dark brown caps, two moist, one dry, two with caps umbonate
20 Vertical section of the upper part of a plant
21 Transverse section of a stem
22 Four spores × 400
23-25 Three plants with grayish brown caps, one moist, two dry, two with caps umbonate
26 Vertical section of the upper part of a plant
27 Transverse section of a stem
28 Four spores × 400
29-31 Three plants with whitish caps, one moist, two dry, two with caps umbonate
32 Vertical section of the upper part of a plant
33 Transverse section of a stem
34 Four spores × 400

Flammula pusilla Pk.

SMALL FLAMMULA

35, 36 Two immature plants
37 Mature plant with convex cap
38 Mature plant with plane cap
39 Vertical section of the upper part of an immature plant
40 Vertical section of the upper part of a mature plant
41 Four spores × 400

PLATE N

Russula magnifica Pk.

MAGNIFICENT RUSSULA

1 Small immature plant
2 Mature plant of medium size
3 Vertical section of the upper part of a mature plant
4 Four spores × 400

Russula earlei Pk.

EARLE'S RUSSULA

5 Immature plant
6, 7 Mature plants with convex caps
8 Mature plant with cap nearly plane
9 Vertical section of the upper part of a plant
10 Four spores × 400

PLATE 82

Tricholoma silvaticum Pk.

WOOD TRICHOLOMA

1, 2 Two plants with umbonate caps
3 Plant with convex cap
4 Plant with plane cap
5 Vertical section of the upper part of a plant
6 Four spores × 400

Tricholoma subacutum Pk.

SUBACUTE TRICHOLOMA

7 Immature plant with grayish brown cap
8 Mature plant with grayish brown cap
9-11 Three plants with blackish brown fibrillose caps
12 Vertical section of the upper part of an immature plant
13 Vertical section of the upper part of a mature plant
14 Four spores × 400

Tricholoma radicatum Pk.

ROOTED TRICHOLOMA

15, 16 Two plants with smoothish caps
17 Plant with minutely scaly cap
18 Vertical section of the upper part of a plant
19 Four spores × 400

PLATE 83

Hygrophorus pudorinus Fr.

BLUSHING HYGROPHORUS

1 Cluster of four young plants
2 Mature plant with convex cap
3 Mature plant with slightly umbonate cap
4 Vertical section of the upper part of a young plant
5 Vertical section of the upper part of a mature plant
6 Four spores × 400

Lactarius luteolus Pk.

YELLOWISH LACTARIUS

7 Immature plant
8 Mature plant with even cap
9 Mature plant with cap rugose
10 Vertical section of the upper part of a plant
11 Four spores × 400

Lactarius subdulcis Fr.

SWEET LACTARIUS

12 Immature plant
13-15 Mature plants, two having caps with a small umbo
16 Mature plant with margin of cap wavy
17 Vertical section of the upper part of a plant
18 Transverse section of a stem
19 Four spores × 400

Lactarius subdulcis oculatus Pk.

EYE-SPOT LACTARIUS

20 Immature plant
21, 22 Mature plants
23 Vertical section of the upper part of a plant
24 Four spores × 400

PLATE 84

Russula crustosa Pk.

CRUSTED RUSSULA

1 Immature plant
2 Mature plant with striated margin of cap
3 Mature plant with even margin of cap tinged with green
4 Mature plant with plane cap
5 Vertical section of the upper part of a young plant
6 Vertical section of the upper part of a mature plant
7 Four spores × 400

Cantharellus dichotomus Pk.

FORKED CHANTARELLE

8-10 Three plants with dark gray umbonate caps, two of them with reddish stains on the stems
11, 12 Two plants with pale gray caps, one with a small umbo
13 Plant with a grayish brown, wavy, margined cap
14, 15 Vertical sections of the upper part of two plants
16 Four spores × 400
17-20 Four plants with short stems
21 Diagrammatic representation of the forking of the gills

FUNGI

FIG. 1-6 HYGROPHORUS SUBRUFESCENS PK.
REDDISH HYGROPHORUS

FIG. 17-34 MYCENA RUGOSOIDES PK.
WRINKLED MYCENA

FIG. 7-16 COLLYBIA UNIFORMIS PK.
UNIFORM COLLYBIA

FIG. 35-41 FLAMMULA PUSILLA PK.
SMALL FLAMMULA

FUNGI

FIG. 1-4 RUSSULA MAGNIFICA PK.
MAGNIFICENT RUSSULA

FIG. 5-10 RUSSULA EARLEI PK.
EARLE'S RUSSULA

THE ARGUS CO., STATE PRINTERS

EDIBLE FUNGI

FIG. 1-6 TRICHOLOMA SILVATICUM PK.
WOOD TRICHOLOMA

FIG. 7-14 TRICHOLOMA SUBACUTUM PK.
SUBACUTE TRICHOLOMA

FIG. 15-19 TRICHOLOMA RADICATUM PK.
ROOTED TRICHOLOMA

THE ARGUS CO., STATE PRINTERS

EDIBLE FUNGI

FIG 1-6 HYGROPHORUS PUDORINUS FR.
BLUSHING HYGROPHORUS

FIG. 12-19 LACTARIUS SUBDULCIS FR.
SWEET LACTARIUS

FIG. 7-11 LACTARIUS LUTEOLUS PK.
YELLOWISH LACTARIUS

FIG. 20-24 LACTARIUS SUBDULCIS OCULATUS PK.
EYE SPOT LACTARIUS

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EDIBLE FUNGI

FIG. 1-7 RUSSULA CRUSTOSA PK.
CRUSTED RUSSULA

FIG. 8-21 CANTHARELLUS DICHOTOMUS PK.
FORKED CHANTARELLE

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7 Metallic Implements of the New York Indians

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FREDERICK J. H. MERRILL Director

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ARCHEOLOGY 7

METALLIC IMPLEMENTS

OF THE

NEW YORK INDIANS

BY

WILLIAM M. BEAUCHAMP S.T.D.

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University of the State of New York

New York State Museum

FREDERICK J. H. MERRILL Director

Bulletin 55

METALLIC IMPLEMENTS

OF THE

NEW YORK INDIANS

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METALLIC IMPLEMENTS OF THE NEW YORK INDIANS

The stone and bronze ages of Europe have little reference to America except in a very broad sense. Using stone implements here from the earliest times to the present day, men may have used copper also in New York when the whites came, as some others had done centuries before. There had been a time when durable or massive implements were made of this. Customs changed. The later New York aborigines knew little or nothing of these implements, and others employed the material only in an ornamental or reverential way. The earlier nations did not despise this use, and well wrought articles for personal adornment are found in many parts of the United States and Canada. South of our national limits beautiful early articles of silver and gold occur. Recent metallic ornaments are frequent in New York, but none have been reported of native copper except beads.

Most of the early discoverers had something to say of copper ornaments, but these may not have been of native metal in all cases. When the Cabots landed at Newfoundland or Nova Scotia in June 1497, they observed that "the inhabitants had plenty of copper," probably the native metal. When Verrazano visited the coast of New England in 1524, he saw many articles of wrought copper, highly esteemed for their color and beauty. The source of these may be doubtful. Cartier found no copper among the Iroquois of Montreal on his visit there in 1535, but heard of it. "They took the chayne of our capitaines whistle, which was of silver, and the dagger-haft of one our fellow mariners, hanging on his side being of yellow copper guilt, and showed us that such stuffe came from the said river. . . Our capitaine shewed them redde copper, which in their language they call Caquedaze, and looking towarde that countrey, with signes asked him if any came from thence, they shaking their heads answered no; but they shewed us that it came from Saguenay, and that lyeth cleane contrary to the other."—*Dawson*, p. 37

There may have been misunderstandings on both sides, but the plain statement is that this people knew copper and had a name for it, though they had none themselves. When Bartholomew Gosnold was at Cape Cod in 1602 he saw a young Indian with plates of copper hanging from his ears. These may have come from European contact, but Gosnold did not suggest this. Farther south they were visited by natives, one of whom wore a copper plate, a foot long and half as broad, on his breast. Others had copper pendants in their ears. John Brereton added to this, accounts of their beads, chains, arrows and other things, and said that not one lacked something of the kind. Another described pipes partly of copper, much as Hudson did in New York a few years later. Belknap says of these statements:

All these Indians had ornaments of copper. When the adventurers asked them, by signs, whence they obtained this metal, one of them made answer by digging a hole in the ground and pointing to the main; from which circumstance it was understood that the adjacent country contained mines of copper. In the course of almost two centuries no copper has been discovered; though iron, a much more useful metal, wholly unknown to the natives, is found in great plenty. The question, whence did they obtain copper? is yet without an answer.—*Belknap*, p. 151

To this it may be said that the arrows, tubes, belts and pipes of copper, as described by Brereton, are all represented on recent Iroquois sites, and may fairly be considered as European articles, furnished by some unknown early trader.

When it is said that Henry Hudson saw "copper tobacco pipes" among the Indians of New York bay, he may have mistaken those of bright red clay for this metal, or they may have come from the same unknown trader. They were not afterward mentioned by any one, and none of native metal have ever been found. The natives could not have cast them, and it would have been extremely difficult to make them by hammering. The copper ornaments seen in this voyage may have had the same source. The brass pipes which Roger Williams thought the Narragansetts made may well be classed with these. They are never mentioned inland, and this affects the question of origin,

but every article described above was in use by the Iroquois in the 17th century. The arrowheads of 1602 are said to be "much like our broad arrowheads, very workmanly done," and brass arrowheads are spoken of by others.

Native copper articles are rare along the New York seacoast and in our mounds, and perhaps are found more rarely still on camp sites. They seem to have been lost in travel. Apparently implements of native copper have not been made in the interior of New York within 400 or 500 years. This conjecture may be changed at any time, though well founded now. The Iroquois of Montreal knew of this metal in 1535, but had none. The Atlantic coast Indians were then more fortunate, either having European or home sources of supply, or communication with the Lake Superior mines, from which the Iroquois proper were cut off. Both these things are probably true.

For the last we may remember that the larger part of the Huron-Iroquois family were somewhat isolated, the Algonquins surrounding them and for a long time keeping some of them under. No members of the Iroquois family lived west of Lake Huron, but their foes did. So they told Cartier that in the country of metals "there be Agojudas, that is as much to say, an evill people, who goe all armed even to their fingers' ends." These wore the aboriginal armor and were continually at war. The Iroquois were then unwarlike and commanded no access to the mines.

The question of a home supply merits attention. Copper occurs in mines, but so it does in scattered fragments. There are even unprofitable copper ores in New York, but no ledges of this metal. Nodules of several pounds weight have been found in Connecticut and New Jersey, and some may have been used and prized by the aborigines near the coast. Farther north there is little doubt that all articles came from Lake Superior at an early day, and they have such marked peculiarities as to make it probable that they were commonly wrought into shape in that vicinity. Occasional rude pieces found in New York also show this was not always the case.

Soon after Quebec was founded Champlain mentioned a piece of very handsome and pure copper given him by an Algonquin. It was a foot long. The great discoverer said, "He gave me to understand that there were large quantities where he had taken this, which was on the banks of a river, near a great lake. He said that they gathered it in lumps, and having melted it, spread it in sheets, smoothing it with stones."—*Champlain*, 2:236

Presumably this refers to Lake Superior, and the melting merely to softening the metal by heat. The statement lacks precision in these ways, but it would have been possible for an eastern Algonquin while in alliance or friendship with the Hurons to reach Lake Superior.

A succeeding statement is more precise. Radisson wintered in 1658 on the shore of that great lake, and mentioned the native copper several times. He seems to refer to ornamental forms when he speaks of a "yellow waire that they make with copper, made like a starr or a half-moon."—*Radisson*, p. 188, 212. This would bring the making of native copper ornaments far within the historic period, but there is no notice of implements. In the same year occurred the visit which brought Lake Superior copper plainly to view. This was made by an Algonquin chief living on the Saguenay, who had passed 10 years in the country of the Nipisiriniens, and whose name was Awatanik. Thence he went to Lake Superior in 1658, spending the following winter there. Two Frenchmen returned from this lake in 1660 with 300 Algonquins, but they said nothing about copper, though they had wintered there also.

The first definite Jesuit report of Lake Superior ore is in the *Relation* of 1660. In that year a French missionary met the Algonquin mentioned, just returned from that region, where he had gone in 1658. He found there "copper so excellent that it is found fully refined, in pieces as large as the fist." The inference is that the Indians east of Michigan had little knowledge of this before. The *Relation* of 1667 contains the journey of Father Claude Allouez to Lake Superior in 1665. He reached the lake September 2, and went on to say:

The savages respect this lake as a divinity, and sacrifice to it . . . They often find at the bottom of the water, pieces of pure copper, weighing from 10 to 20 pounds. I have seen these many times in the hands of the savages, and as they are superstitious, they regard them as so many divinities, or as presents that the gods who are at the bottom of the water have made them to be the cause of their good fortune; it is for this that they keep these pieces of copper wrapped up among their most precious movables; there are some who have preserved them more than 50 years; others have had them in their families from time immemorial, and cherish them as household gods.

The truth seems to be that the interior aborigines had ceased to use native copper implements more than 300 years ago, some resuming their use at a much later day. Where native copper was known it had become almost sacred, not to be used in common ways. Farther east it was little known, occurring on no village sites in New York, and rarely in camps.

The missionary did not then see the great copper rock projecting from the water, of which he had been told, but later travelers did. He recorded the fact that passers-by cut pieces from this. This is described in the *Relation* of 1670. "Advancing to the end of the lake, and returning a day's journey along the southern side, one sees at the water's edge a rock of copper which weighs at least seven or eight hundred pounds, so hard that steel will scarcely penetrate it. When however it is heated, it is cut like lead."

There are many other mentions of plates and masses of copper seen, but these need not be quoted here. One other quotation will be made to show the sacred character that it had gained, after having had common uses. This is from the same *Relation:*

At that time the savages told a story of a floating island which approached or receded with the wind. Four men reached this one day and prepared their dinner in their usual way. Heating the stones they found and casting them into the water to make it boil, they discovered that they were copper and that this lay plentifully around. After eating they loaded their canoe with pieces and plates of the metal and were soon homeward bound. They had not gone far when a great voice called to them, asking why they carried off the cradles and the diversions of his children. "The plates of copper are the cradles, because among the savages they are made of only one or two boards joined together, on

which they lay down their children; and these little bits of copper which they were carrying away, are the playthings and diversions of savage children, who play together with little stones." One said it was the Thunder spoke; one the god Missibizi; another the water men. Two Indians died on the way home, the others soon after, and no one dared visit the floating island again.

A friend of the writer, the late Dr P. R. Hoy, of Racine Wis. published two papers in 1886 on the important questions, *How and by whom were the copper implements made?* The first paper he read in 1876, the second in 1882. That they were not cast he showed, because the aborigines could not produce the heat required, but copper could be softened by judicious applications of heat and cold. He thought that implements were hammered or pressed into shape in stone molds, and made successful experiments. Lastly, he thought most native copper articles were made after the white men came, a conclusion not so easily proved. His arguments will not be reproduced here, but some of his facts will be mentioned.

Copper articles were made near Lake Superior for export and trade elsewhere. In 1882 there were found 26 copper implements close together, under a small pile of stones at the Sault Ste Marie. In the lot were six awls from 3 to 6 inches long, five knives of various sizes, and 16 axes, hammers and chisels. These must have been made for trade. For recent use he cites witnesses to the copper implements used by the modern Chippewas and Winnebagoes. One Indian agent certified that when he first came among the latter, "many of them carried lances headed with copper, and it was quite common to see arrows headed with copper." These points may have been like those used by the Iroquois 250 years ago. Out of over a hundred mounds opened near Racine none contained copper. Among hundreds of native copper implements in the Perkins collection not one came from a mound. This led him to conclude that such articles were later than the mound builders.

Great quantities of native copper-ornaments have been found in Ohio mounds. Mr Warren K. Moorehead took three or four thousand spool-shaped ornaments out of the Hopewell mounds

alone. These are properly mound articles, thus far unknown in New York. He found there many articles of sheet copper, sometimes stamped or ornamented, naturally suggesting recent material but clearly aboriginal. It is definitely known that native copper was beaten thin enough for turning the edges under and overlaying prepared forms. Out of one of these mounds Mr Moorehead took a copper ax 22 inches long and 6 inches wide. This weighed nearly 38 pounds, not quite seven times as heavy as the largest New York implements of this kind.—*Moorehead*, p. 325

Wisconsin naturally affords the greatest supply, being near the ancient mines. Mr F. S. Perkins sold 143 local copper implements to the Wisconsin historical society, and in 1886 had another collection of over 600 exclusive of beads. The Hamilton collection is also notable, containing most New York forms, as well as small fishhooks and unusual ornaments. The University of Pennsylvania has 560 articles gathered from a space of 5 acres in Wisconsin. The writer met with a curious Wisconsin collection at Manitou Col. The articles were flat and symmetric, cut from rolled or beaten copper and showing none of the irregularities of early implements. Some found at Brewerton N. Y. are suggestive of these. Native copper articles occur in Michigan and Minnesota. In the latter they are well distributed and include eastern forms but are not numerous. Canadian implements are nearly related to those of New York, and the shores of Lake Ontario and the St Lawrence have afforded many. Others occur on both sides of Lake Champlain.

New England is fairly represented and has some notable forms. Pennsylvania has a number of implements and ornaments. Dr C. C. Abbott knew of 128 copper articles in New Jersey in 1885, but they were not all fully wrought. They included 11 celts, five spears, eight arrowheads, 13 bracelets, 70 beads and 21 pieces of copper. At one time he had thought it "not improbable that all the copper articles found along the Atlantic coast were brought from western localities. A careful resurvey of many localities where ordinary Indian stone implements occur in

abundance, and correspondence with collectors in various parts of New Jersey and eastern Pennsylvania now convince me that the use of copper, as implements and ornaments, was much more common than I supposed, and that among the Delaware Indians were many coppersmiths." He cites examples of articles which he thought were made of New Jersey copper, this not being rare. One mass in Somerset county weighed 100 pounds, and it also occurred in the eastern counties of Pennsylvania. Finished ornaments were found in graves with others unfinished, and in one grave was a copper nodule of 13 ounces. His final opinion is thus expressed:

> It would appear, then, from an examination of the copper objects found in Pennsylvania and New Jersey, that the weight of probability is strongly in favor of their home manufacture; and the similarity of the forms to those taken from areas where mounds occur is another fact in favor of the rapidly growing impression that the builders of these earthworks and the Indians of the coast were essentially one people.—*Abbott*, p. 774-78

Dr Abbott's statements are weighty, but there are other facts which may prevent their full acceptance. No argument will be held on these now, one important fact clearly appearing, that there were supplies of native copper accessible to the coast Indians which were not available to those in the interior of New York.

Mr David Boyle remarks that copper articles are comparatively rare in the province of Ontario and that the line of distribution seems to be through the Georgian bay and along the Ottawa river. Few have been reported in the Neutral country, lying near the north shore of Lake Erie. As a matter of fact the Toronto collection has many fine examples of early and recent forms. The latter are not so frequent as in New York, owing to the overthrow of the Huron, Neutral and Tobacco nations in the middle of the 17th century. The country was depopulated just as these were beginning to be most freely used. Those of native copper have a few forms not reported in New York. Some fine articles come from Wolfe island, opposite Cape Vincent. As this lies nearer the New York mainland than that of Canada,

these might well be described and illustrated as New York specimens. Those found in the mound at Brockville are merely separated from the New York shore by the St Lawrence, and are like those found elsewhere in the state.

The collection of Mr A. E. Douglass, of New York city, includes 78 copper objects, mainly from Ohio. He does not state how many are of native copper, but divides them into spears, celts, knives, hammers, vessels, beads in lots, bracelets, implements, ornaments, tubes, pipes, arrows and grooved axes. Of these one arrow, one implement, two bracelets and six ornaments are from New York. Nearly half are from Ohio.

Prof. George H. Perkins has described and figured some of the native copper implements of Vermont and Dr Abbott has illustrated a celt from Maine. Some copper articles have been found in Manitoba, but these do not essentially differ from those farther east. Excepting a small space in Ohio distinguished by quite remarkable articles, there is thus a very large district in which nearly all native copper relics are practically of the same types.

It must be remembered that the occurrence of these in the territories of historic nations is no evidence that they were made by them. They are scattered all through the territory of the Iroquois family, but are not found on the village sites of that people, early or late. The presumption is that they were made by an earlier people still. They are found in the land of the Lenape, but we must connect them with known villages of that people before we can assert they were made by them. As far as evidence goes, in the eastern states they were usually lost by the wayside or in temporary camps, or else were buried with the dead. An observation by Dr D. S. Kellogg on those of Lake Champlain is worthy of attention. "Of copper spearheads, hatchets and gouges about two dozen have been found. These have been entirely surface or field finds. Not a single copper relic has as yet (1887) been obtained from a dwelling site." This is not invariable elsewhere, but is a general rule having importance. In New York, at least, all native copper articles may be safely called prehistoric.

As copper was prized for ornamental purposes from the beginning it seems to have been a very acceptable gift from early voyagers. Any metallic ornament would not only be prized but preserved, and there is good reason to suppose that such things, given to the Iroquois of Hochelaga and other places by Cartier or his men, were afterward brought to New York. This will appear in its proper place.

When trade with the Dutch and French opened more fully in the early part of the 17th century, metallic implements and ornaments were in great request. One has only to look over old bills of supplies and purchases to see how great was their quantity and variety. For ornamental purposes bronze, brass and nearly pure copper long had sway. About the beginning of the 18th century silver began to take its place, and for 150 years held its own as the fashionable material. Loskiel spoke of this. "The rich adorn their heads with a number of silver trinkets of considerable weight. This mode of finery is not so common among the Delawares as the Iroquois, who, by studying dress and ornament more than any other Indian nation, are allowed to dictate the fashion to the rest."—*Loskiel*, p. 52

A great number of forms became common, and all were lavishly used. Some were very beautiful and were tastefully employed. At first they were made by the whites, but the Iroquois soon learned the art and had their own smiths in every village. Such ornaments were abundant till the civil war, when the high price of silver brought many to the smelting pot. It is difficult to obtain even the smaller ornaments now.

Prof. Cyrus Thomas has wisely called attention to the large supply of copper furnished to the coast Indians by early explorers and colonists, and to the use made of it. He says:

A careful examination of the copper articles found in the mounds should lead any one, not swayed by some preconceived notion, to the conclusion that many of them were made of copper brought over to America by Europeans, which would as a matter of course indicate (if they do not pertain to intrusive burials) that the mounds in which such specimens are found were erected subsequent to the discovery by Columbus. The

copper articles found in the mounds and ancient graves belong, as may be readily seen by those who will inspect them, to two usually very distinct classes; those of the one class evidently hammered out with rude stone implements; those of the other class showing as plainly that they have been made from quite thin, smooth, and even sheets.—*Thomas*, p. 710

He has no doubt that some important mounds were made in quite recent times, and cites many early authorities to show how great a supply of metals was afforded to the Indians by European explorers, traders and colonists. In Virginia they were lavish with copper, and Smith said that in a short time goods "could not be had for a pound of copper which before was sold us for an ounce."—*Smith*, 1: 166. Strachey said that Powhatan wished to monopolize the copper trade:

Whereas the English are now content to receive in exchange a few measures of corn for a great deal of that mettell (valuing yt according to the extreme price yt bears with them, not to the estymacion yt hath with us). Powhatan doth again vend some small quantity thereof to his neighbor nations for one hundred tyme the value, reserving, notwithstanding, for himself a plentiful quantity to leavy men withal when he shall find cause to use them against us, for the before-remembered weroance of Paspageh did once wage fourteen or fifteen weroances to assist him in the attempt upon the fort of Jamestowne, for one copper plate promised to each weroance.—*Strachey*, p. 103

It appears that Powhatan had articles or pieces of native copper, but they were not abundant nor as beautiful as those of the English, and so he coveted these. Capt. John Smith often referred to this trade in copper and iron, but his most important statement was in connection with his visit to the Tockwoghes in 1608. These lived far up Chesapeake bay, and were at war with the Massawomeks, a branch of the Iroquois family, and probably a part of the Eries. The Susquehannas were friends of the Tockwoghes, and of the latter he said: "We saw among these people many knives, hatchets, and pieces of brass, which they said they had from the Sasquesahanocks, a mighty people, and mortal enemies to the Massawomeks." He elsewhere describes his visit with the Susquehannas, adding that, "many descriptions and discourses they made us of Atquanahucke,

Massawomekes, and other people, signifying they inhabit the river of Cannida, and from the French to have their hatchets and such like tools by trade."

The Virginia Indians told him that this hostile people lived "on a great salt water, which by all likelihood is some part of Commada, some great lake, or some inlet, or some sea that falleth into the South Sea." In his well known account of his battle on Lake Champlain in 1609, the great French explorer observed that the Mohawks had axes of iron, though that year included his own first visit to New York and the first Dutch voyage up the Hudson river. He said: "The Iroquois repaired on shore, and arranged all their canoes, the one beside the other, and began to hew down trees with villainous axes, which they sometimes got in war, and others of stone, and fortified themselves very securely." We are thus not to limit the possible use of European metallic articles in New York to the year 1609. It is every way probable that a few implements or ornaments reached the interior many years before, and in some instances these may have been found.

Attention has elsewhere been called to early wrecks along the Atlantic coast, whence some metal was obtained. More of these occurred than ever were reported. Fishermen from Europe haunted the mouth of the St Lawrence and the points and islands adjacent but did not publish their voyages. They were not exploring, but getting a living. In a similar way, at a later day, there were French and Dutch traders penetrating the wilds of New York, of whose names and adventures we are equally ignorant. For their own profit they said as little as possible.

It is somewhat surprising to see how rapidly our knowledge of the early use of copper has grown. Squier and Davis brought to light many copper ornaments and articles in their mound explorations, the report of which was published in 1848. The report of Foster and Whitney on the Lake Superior district, published in 1850, showed something of the early work done there. Schoolcraft was at his best in that region. Lapham

added much in writing on the antiquities of Wisconsin in 1855. Col. Whittlesey published his account of ancient mining on Lake Superior in 1863, yet Dr Charles Rau said, in his paper entitled *Ancient aboriginal trade in North America:* "The Smithsonian institution has been receiving for years Indian antiquities from all parts of North America, yet possessed in 1870 only seven copper objects: namely, three spearheads, two small rods, a semilunar knife with convex cutting edge, and an ax of good shape."—*Rau. Aborig.* p. 94. There are more there now, and yet but few compared with some private collections.

The Lake Superior copper sometimes contains small masses of native silver. Where this is present the source of the supply may be known but its absence is no test. Most articles show raised spots and lines, retaining a hammered appearance. The softer metal between is corroded. The stone hammers and rude wooden tools of the early miners are yet found where they worked centuries ago. Col. Whittlesey thought 500 years had passed since that time; Mr Lapham allowed a much more recent period. It will be seen that the Jesuit *Relations* speak of work done there in the latter half of the 17th century. While it is probable that many implements were made in adjacent districts, it is perfectly clear that masses of metal were carried away to be cut up and wrought elsewhere. Such blocks have been found and the Jesuits mention those that they had seen or owned.

In common with others the writer at first could hardly resist the belief that the early copper articles brought to him were cast in a rude matrix of sand. Much of the surface appears like a rough casting, and the longitudinal raised lines could be attributed to cracks in the mold. Dr Hoy thought the metal was subjected to a great pressure in a matrix of stone. The prevalent opinion now is that all our implements of this kind were hammered into shape. One surface is usually flat but the reverse quite commonly has a central and longitudinal ridge. On this surface the workman hammered along one side and then changed ends to hammer the other, the slightly oblique

blows producing a central ridge. Dr Thomas Wilson, of the Smithsonian institution, told the writer of his experiments in such forging, and gave a high rank to the aboriginal workman. He found peculiar difficulties in bending over the lower edges to form the socket. This feature appears in some European bronzes locally termed winged celts. Some New York articles show greater skill than any copper celts in Washington.

The Indians, however, soon learned to cast metals, if reports are true. Roger Williams said of those in New England: "They have an excellent Art to cast our Pewter and Brasse into very neate and artificiall Pipes." Such pipes were found in New York, but melting brass has difficulties, and such a native art may be doubted. Metal was sometimes used for lining pipes, both of horn and stone, and there are other examples where stone and metals were otherwise combined. All these are recent.

The distribution of early copper articles in New York is somewhat uniform on the whole, excluding the lower Hudson and Long Island. Cattaraugus and Chautauqua counties have some reputation in this way but the rather indefinite reports seem exaggerated. A good antiquarian says that in 50 years residence he has seen but one native copper arrowhead there. Onondaga county and the drainage of the Genesee river have afforded many. Fine examples have come from Jefferson county and the islands of the St Lawrence. Lake Champlain and the upper waters of the Hudson are well represented by these early relics. Some have been found on the Susquehanna.

It seems certain that the Iroquois had no metallic articles which they did not have from the whites. These they gladly adopted and the advent of the Dutch became a new era in their life. All Europeans were termed by them *Aseronni*, Makers of axes, but this was specifically the name of the Dutch. This was the definition of Father Bruyas, an excellent authority. Megapolensis interpreted it differently: "They call us *Assyreoni*, that is Cloth-Makers, or *Charistooni*, that is Iron-Workers, because our People first brought Cloth and Iron among them."—

Hazard, p. 517. It seems better to make the word mean Knife-makers than to refer it to axes. Axe is *atoko*. In the old Mohawk *assire* was cloth, and *assere* knives, so that either definition would stand as given by Megapolensis.

Loskiel said, "Many of the Delawares and Iroquois have learned to make very good rifle-barrels of common fowling-pieces, and keep them likewise in good repair." They also learned to make silver ornaments from coin, and even to insert colored glass when desired.

Native copper articles

It will be seen that articles of native copper stand distinctly apart from all others, and should be considered by themselves. With slight exceptions those of New York have a useful character, and were probably all made before the close of the 15th century. Some found on early Huron sites in Canada may have had a more recent date and some may well have been known to the later Hurons, reaching them through western trade. The form suggesting our case knife has been thought to show a knowledge of European art, but specimens of this are rare both in Canada and New York. The copper hooks of Wisconsin imply the same, but no early examples of these have appeared here.

One fact must be borne in mind in speaking of the scarcity of any early metallic articles. In early pioneer days in New York recent Iroquois village sites were prized sources of supply for iron and brass. Reference to this will be made later. Native copper articles have proved useful or salable, and many a one has gone into the crucible. Some of the finest figured by the writer have been barely rescued from such a fate, and others lay for years in the farmer's tool chest, serving some rude end. The present scarcity is therefore no absolute test of former numbers, though they were probably small. This is partly inferred from the opening of new sites, where other articles abound. Those found seem to have belonged to transient visitors and not to a settled people.

A large proportion of these remarkable articles have the celt or chisel form, usually narrower at one end than the other, but sometimes with the edges parallel. The finest brought to the writer's attention was once owned by the late J. S. Twining, who sold it to some one outside the state. Fig. 61 is reduced one half in length from the outline furnished by Mr Twining, the full length being $14\frac{3}{4}$ inches and the breadth $1\frac{7}{8}$ inches. The greatest thickness of the lateral edge is $\frac{5}{8}$ of an inch, the total thickness being about double this. It weighs $5\frac{1}{2}$ pounds. One surface is flat, and the other ridged as usual. The ends are thinner than the center but one is beveled to a sharp cutting edge. It was plowed up by Mr Farnham at Oxford N. Y. in 1856, and Mr Twining bought it of his heirs. It is to be regretted that this unusually fine article did not remain here.

Fig. 7 is a reduced drawing of another copper celt, almost the counterpart of the preceding except in size. Its weight is 2 pounds, 14 ounces, or a little more than half that of the last, but it is but about a fifth shorter. This implement is slightly beveled in thickness toward each end, one of these having a dull chisel edge. It is $11\frac{1}{2}$ inches long, $1\frac{9}{16}$ broad and $\frac{13}{16}$ thick, being a little wider at the cutting edge where it suddenly and slightly expands. One surface is nearly flat but a little depressed along the center; the other ridged as usual but slightly hollowed on each side of the central line of the ridge. This is a common feature. There are the usual flattened rough lines, showing traces of the hammer. The first owner cut the upper corner to test the material, a very frequent practice. This fine celt was found in May 1880 by Mr J. F. Shultz on lot 22, town of Clay N. Y. and was at first sold for old copper, but soon came into the Bigelow collection, where it may now be seen.

Fig. 3 is of the same general form and is much reduced. It is ridged on one side but is narrower at one end than at the other. This is in the Smithsonian institution where it is credited to Keeseville N. Y. Dr D. S. Kellogg locates it more exactly at Auger pond, Keeseville, where it was found many years ago by a Mr Hackstaff. It is $9\frac{7}{8}$ inches long and has a medial width of $1\frac{1}{2}$ inches, being somewhat smaller than the last.

Fig. 5 is also reduced, and the lateral edges gradually contract. It is 7⅞ inches long with a medial width of 1⅞ inches. The cutting edge extends to a central point and the bevel to the ridge commences almost at the flat surface, which is the one shown. The first owner unfortunately filed down most of the rough ridges on one side of the back. It was found on the farm of B. C. Case, north of Lake Neatawantha and toward Oswego river, near Oswego Falls. It is now in the Bigelow collection. The bevel at the point is more abrupt than usual.

Fig. 9 is another fine celt in the same collection, which embraces a large proportion of the native copper articles illustrated here. It was found by Mr Charles Woods on his farm, about 3 miles due east of Baldwinsville N. Y. lot 82, Lysander. This was in April 1878. The hard ridges are black, appearing mostly on the flat side, where a narrow central one extends from end to end. The under surface is ridged as usual and it is somewhat pointed at both ends, the cutting edge being almost rectangular in the center. The extreme length is nearly 7 inches, the greatest width 1½ inches and the thickness ½ inch. Below the center the sides are nearly parallel as far as the cutting edge and most of the small ridges are toward that end.

Fig. 10 was in the collection of Mr Albert Hopkins of Phoenix, but its present abode is unknown. It was found in Oswego county in 1878 and has undergone some filing, without seriously affecting its character. On the flat surface represented the hard, longitudinal ridges are unchanged. The expanded and rounded edge on this side is slightly hollowed like a shallow gouge. The back is rounded, not distinctly ridged. The extreme length is 5¾ inches, medial width 1 inch, width of edge 1 5/16 inches and thickness ⅜ inch.

Fig. 53 is a parallel edged copper celt in the collection of Mr John Martin, Plattsburg N. Y. It was found on the Jones farm 2 miles north of that place. The surface is beveled toward each end, moderately sharpened at one, and is weathered and green. It weighs 7½ ounces. The owner says: "One end was pounded by a hammer, which shows that one end was lapped."

Fig. 39 has also parallel edges and is quite broad for its length. It is in A. H. Waterbury's collection, and was found between Bridgeport and Oneida lake. The length is $4\frac{5}{8}$ inches and the average width $1\frac{3}{8}$ inches. The edge is rounded and slightly expanded.

Fig. 40 is still wider in proportion and suggests an ax. It belongs to Mr Albert Rose of Manchester Center, Ontario co. N. Y. and was found on the Rose farm, a little over a mile north of the old ford at Canandaigua outlet. Mr Irving W. Coats made the drawing in 1892. He says it is of native copper and is 3 inches long. The extreme breadth is $1\frac{5}{8}$ inches, being a little less at the head where there is a rounded depression. The cutting edge is curved, as usual.

Fig. 23 has the modern ax form and came from Livingston county, N. Y. It is of native copper but has unfortunately been ground down. This is in the Smithsonian collection and is of actual size.

Fig. 60 is taken from Squier's *Antiquities of the state of New York* (p. 122) and is here of actual size. He said:

One of the most interesting relics which has yet been discovered in the state, is an ax of *cast copper*, of which fig. 25 is a reduced engraving. The original is 4 inches long by $2\frac{1}{2}$ broad on the edge, and corresponds in shape with some of those of wrought native copper, which have been found in the mounds of Ohio. From the granulations of the surface it appears to have been cast in sand. There is no evidence of its having been used for any purpose. Its history, beyond that it was plowed up somewhere in the vicinity of Auburn, Cayuga county, is unknown. No opportunity has yet been afforded of analyzing any portion, so as to determine whether it has an intermixture of other metals. It appears to be pure copper. An inspection serves to satisfy the inquirer that it is of aboriginal origin; but the questions when and by whom made, are beyond our ability to answer. There is no evidence that the mound builders understood the smelting of metals; on the contrary, there is every reason to believe that they obtained their entire supply in a native state, and worked it cold. The Portuguese chronicler of Soto's expedition into Florida, mentions copper hatchets, and rather vaguely refers to a "smelting of copper," in a country which he did not visit, far to the northward, called "Chisca." The Mexicans and Peruvians made

hatchets of copper alloyed with tin. It would seem that this hatchet was obtained from that direction, or made by some Indian artisan after intercourse with the whites had instructed him in the art of working metals. At present it is prudent to say that the discovery of this relic is an anomalous fact, which investigators should only bear in mind, without venturing to make it the basis of deductions or inferences of any kind.

Mr Squier was one of the most accurate and judicious of writers and these words may have held in check the extravagant surmises and theories in which some of his contemporaries indulged. At the same time some of our best authorities have determined that many articles which appear to have been cast were really brought into shape by hammering. The first impressions are of a rude casting.

Dr Charles Rau at first allowed the casting of this article.—*Rau*, p. 92. In collecting his papers in 1882 he made a prefatory note as follows:

Reference is made to a *cast* copper ax plowed up near Auburn, Cayuga co. N. Y. and first described and figured by Mr Squier on p. 78 of his *Aboriginal monuments of the state of New York* (Wash. 1849). Several years ago, while in conversation with Mr Squier at his residence in New York I happened to see the same ax lying on the mantelpiece. In handling the object I noticed that a small portion had been removed from it—for close examination by an expert, as Mr Squier informed me. This examination resulted in the discovery that the ax was not cast but hammered into shape from native copper. The former inhabitants of North America, I still believe—notwithstanding all assertions to the contrary—were unacquainted with the art of melting copper.—*Rau*, pref. p. vii

As to modes of working copper and the differences between the native metal and that brought by Europeans, reference may be made to a valuable paper by Mr Clarence B. Moore. He gives analyses of several articles from recent New York sites, but was unable to obtain those of native copper. From other sources some were procured. In that paper he quotes a personal letter from Prof. F. W. Putnam which is of general interest and is therefore reproduced here:

Just after I wrote my little paper on copper in the museum as the beginning of a series of papers on the use of metals,

copper began to come in from our Ohio explorations in a wonderful manner, until we now have copper in such abundance that a paper on the subject would be a volume. We have it hammered and cut into all manner of shapes—implements and ornaments—and with it have come several lots of ornaments made of meteoric iron—implements and ornaments—and also considerable silver (ornaments) and a little of gold. All these metals are hammered and cut, and we have the copper in all stages from the rough nuggets, through those partly hammered, to the sheets and the objects cut from them. To consider this the work of Europeans is an absurd perversion of the facts before us; and yet just because the facts do not agree with the theories of some who would have all facts drop into their theories, or else throw them out of consideration, these objects are spoken of as unquestionably of European origin, *traded* to our old mound building people of the Ohio valley by whites since the settlement of the country.—*Moore*, p. 220

Prof. Putnam's conclusion is that native copper articles of any kind are to be considered prehistoric if unaccompanied by European relics. Dr Cyrus Thomas has as plainly shown that European metallic articles have been found deep in some large mounds. His remarks have been quoted.

A large proportion of native copper celts gradually expand toward the cutting edge. Fig. 38 is a good example in the Bigelow collection, which was found on lot 99, Lysander, in 1881, not far from Seneca river. The ridged side has more protuberances than usual, and on the flat side a single medial line extends the whole length, with a few small ones near the margin. The thin top is bent over by hammering, showing how it was used. This figure is of actual size, as are all those where no dimensions are given.

Fig. 30 is in the same collection, and has an expanded cutting edge. It was found on the Ouderkirk farm, lot 76, Lysander, near Seneca river, and is quite thick and not very sharp, the edge having been dulled by use. One side is ridged as usual.

Fig. 12 is a very fine celt of this kind, the flat side of which is shown. A hollow above the cutting edge suggests a gouge. This edge is more rounded than usual and the other end comes to a point. The full length is a little over 5½ inches, and the

implement is quite sharp. It was found on the Voorhees farm, lot 99, Lysander, in 1881. A lateral view is added.

Fig. 19 is a fine copper celt from Point Alexander, Wolfe island, north of Cape Vincent N. Y. It is much more tapering than most of those described and is 7 inches long. Though just north of our border it was found by one of our citizens and is in the Richmond collection. All along the St Lawrence the occurrence of copper implements on either shore may be considered an accident of travel. They occur on Wolfe island, Tidd's island near Gananoque, at Brockville, and on islands farther down the stream.

Fig. 62 was found on the south side of the Oneida river at Brewerton, and is in the Bigelow collection. It is $5\frac{3}{8}$ inches long, and is nearly flat on both sides. There are many linear ridges and it is somewhat sharp at both ends. The broad end had the corner cut by the finder.

Fig. 28 is from Dr Rau's half length of a New York copper celt, fig. 227 of the *Archaeological collection of the United States national museum*. He said of this:

The most beautiful article of a wedgelike character is a kind of chisel with an expanding, strongly curved edge, which shows a slight concavity, imparting to the implement almost the character of a gouge. The upper surface is nearly even, but the back part presents, as it were, two faces, which join in the middle, forming a longitudinal ridge.

Fig. 4 is from an outline sent to the writer by Dr D. S. Kellogg of Plattsburg N. Y. and shows a rude copper knife or hatchet, having the usual raised lines on both sides. It is reduced in the figure, measuring 3 inches between the extreme points.

Fig. 73 shows a large copper gouge with parallel edges. Perhaps from some flaw in the metal it was partially broken at the upper end and an attempt has been made to cut it off. It was found near Constantia, on the north shore of Oneida lake, about 1850, by Mr James Haynes. It went into the Terry collection. No implement has been found like it here and it is quite deep and thick.

Fig. 1 seems the finest specimen of its class yet found, weighing 3 pounds, 2 ounces, and being a little over $10\frac{1}{4}$ inches long.

The extreme width is 2 inches and it is $1\frac{1}{2}$ inches wide at the narrow end. The extreme depth is $1\frac{1}{2}$ inches. It is ridged on the lower side and high and sloping flanges form a socket at the broad end. These occupy more than a third of each lateral edge and a broad depression extends between them for $3\frac{1}{2}$ inches, against the angle of which the handle abutted. This feature often appears in spearheads made for similar hafts. It was found by Chester Wells in 1885, a mile south of Granby Center and was long used as a wagon wrench. A small piece was broken out of one of the flanges by him. The point is also now dull, but this might have been so centuries ago. It is now in the Bigelow collection. There is a smaller one like this in the national museum, which Dr C. C. Abbott called "a nameless object." It is $7\frac{3}{8}$ inches long and has an extreme breadth of $1\frac{1}{2}$ inches. The flanges occupy full half of the length and the socket measures $3\frac{1}{4}$ inches to the abutting angle. This came from Somerville N. J. A copper gouge, found in the Brockville mound, Canada, has similar features. In the Toronto collection there is a large adz of the same type but on the whole it is a rare form.

Fig. 21 is a very small article of native copper like a celt, and neatly formed. It is quite flat and was found on the island at Brewerton.

Fig. 22 came from the same place. It is a small cylindric piece of native copper which appears to have been worked, but not into any definite form.

Fig. 75 is a long and somewhat triangular article of native copper, which is flat and of uniform thickness throughout. It may be unfinished but would serve as a rude spear without sharpening. This was found at Union Springs and weighs $1\frac{1}{2}$ ounces. It is $5\frac{3}{4}$ inches long and the expanded base is nearly an inch wide. This may have been the beginning of a flanged socket.

Fig. 29 is a tube of native copper which may have been ornamental or useful, either as bead or sinker. A section of this is shown. It is rough, and made of a copper plate bent into a

cylinder and hammered together. One end is thin. It was found on the Oneida river about 20 years ago but its present owner is not known. The length is $2\frac{1}{2}$ inches.

Fig. 17 is a sharp and slender awl from Mr S. L. Frey's article in the *American naturalist* of October 1879, entitled "Were they mound-builders?" He said:

It might have been used for piercing holes in buckskin garments but as implements for this purpose were usually made of bone, with the point rounded and sharpened in a similar manner, and as these were obtained with comparative ease and were equally serviceable for sewing purposes, I think that possibly this copper implement had a different, or at any rate an additional use. According to many early writers the natives at the time of the discovery were found in possession of ornaments, necklaces, etc. of pearls, the perforating of which was done with a heated copper spindle. The square shape of this implement indicates that it has been set in a handle, and the point being very smooth, shows use of some kind. That it was intended for a drill of this description seems not improbable when viewed in connection with certain shell relics subsequently found, and which are described in this article.

The great neatness of this implement led to further inquiry and Mr Frey wrote: "The copper awl you figure from my drawing is exact. It is just as smooth and well finished as represented. It is the only prehistoric copper I ever found; in fact the only one, as far as I know, ever found in this section." This illustrates the curious elimination of early travel and habitation in the Mohawk valley. East, north and west of that valley, native copper articles have been often found.

The burial place was of a mixed character, for at the time he found this Mr Frey had not discovered the curious graves and relics which rewarded his labors at a later day. In his earlier digging he had found "at one time, in a grave, 30 arrowheads and a small copper awl." In one of those opened afterward he found copper beads, to be mentioned later. This judicious observer noted the widely different character of the graves, concluding that they could not be those of the same people. It is also to be remembered that there was no large village site close at hand, and that part of the cemetery had been removed before examination. The writer has since examined this awl.

Regarding Mr Frey's general question a few words should be said. But one other awl of this character has been reported from this state and this is much larger. It was a surface find. In other states they have been found in mounds. Prof. Cyrus Thomas reported several of these with illustrations and they closely resemble those of New York. In the Sue Coulee group, Crawford county, Wis. were copper articles with one of the skeletons. "Near the hand of the same skeleton were two long, slender, square copper drills or spindles, one about 9 inches long and $\frac{1}{4}$ inch thick, pointed at one end and chisel-shaped at the other; the other 7 inches long and pointed at both ends."—*Thomas*, p. 76. In another mound of the same group was a small one of similar character and a large copper ax, with copper beads and an obsidian implement. In one of the Rice lake mounds, Wisconsin, was a similar drill or spindle $7\frac{1}{2}$ inches long and pointed at both ends. In a mound on the Holston river, Sullivan co. Tenn. a copper spindle lay on the head of a skeleton. "It is 11 inches long, $\frac{1}{4}$ inch in diameter at the thickest part and appears to have been roughly hammered out of native copper with some rude implement. Immediately under the lower jaw were two small copper drills or awls with portions of the deer-horn handles still attached."—*Thomas*, p. 351. These quotations will show the proper place of the New York copper awls.

Native copper spears of two types have a wide range. In some the base is drawn out into a sharp or obtuse point for insertion in the shaft. These are usually notched on the lower edges for attachment by cords. In others the lower edges are raised and bent over, forming an angular socket, neatly made. This is often deepened for a short distance so that the shaft abuts against a shoulder. The flanges usually turn inward, giving a firmer hold. Unless very thin the blade is flat on one side and ridged on the other, and the usual hammered protuberances appear. New York specimens may have one or two notches on each side but some have none. In other states they occur with several deep and narrow notches on either side. Prof. G. H. Perkins has figured a fine example of this kind from Ver-

mont, and Mr Francis Jordan jr of Philadelphia found one remarkable example in 1890 on the eastern shore of Maryland, which is about 12 inches long, ridged and angular, and with six notches on each side of the base. This form has not been reported here. He found a large hoe blade of copper at the same time. The former is figured in the *Proceedings of the Numismatic and antiquarian society of Philadelphia for 1890–91*, p. 128.

Fig. 74 is a curious undulating spearhead obtained by Mr Twining in Ellisburg N. Y. There are double notches on each side of the base and the undulating edges are suggestive of some Scandinavian weapons. It is quite slender for its length, being $7\frac{1}{2}$ inches long with a maximum width of $\frac{5}{8}$ inch near the base, which terminates in a sharp point. Those found near the Seneca river often end in this way.

Fig. 35 is a very fine example from the latter region, now in the Bigelow collection. It is one of those drawn by the writer for Dr Abbott's *Primitive industry*, and was found on the Crego farm, just west of Baldwinsville and south of the river, near but not on an early fort site. The writer afterward found a small native copper bead there. The flat side is slightly concave, giving the implement a decidedly curved appearance. The present length is $7\frac{1}{4}$ inches, but the basal point has been slightly broken. The extreme width is a little over $1\frac{1}{2}$ inches. There is a basal notch on each edge for attachment. Each side of the longitudinal ridge is moderately hollowed, and the usual raised lines appear, the whole implement suggesting a rough casting, an appearance now known to be deceptive.

Fig. 31 is also in the Bigelow cabinet and was found on the Judge Voorhees farm, lot 71, Lysander, in 1875. It has a pointed base, but no notches, and is but slightly ridged. The blade is much thinner than the general base, a common feature with this form. A smaller similar one was found near Beaver lake, about 2 miles northeast of the last locality. This has disappeared.

Fig. 27 is in the same collection and much like the last. It was found in uprooting a large tree in the town of Hannibal in 1878–79.

Fig. 26 is a rough native copper spear with an obtuse point, possibly broken or unfinished. It is in the Smithsonian collection and came from Malta N. Y., west of Saratoga lake.

Fig. 25 is in the same collection, and came from Livingston county, N. Y. The base is not pointed and the implement suggests both the knife and spear. It is slightly rounded, and there are no basal notches.

Fig. 32 is in the Bigelow collection, and was found on R. Adsit's farm, lot 76, Lysander, north side of the river road and toward Beaver lake. Several copper implements have been found near there. This is a small form, flat on on side and rounded on the other. There is a notch on each side toward the pointed base. It is hardly 3¾ inches long but is neatly finished.

Fig. 50 is a thin copper spearhead found half a mile east of Onondaga creek, and nearly a mile south of East Onondaga village, beside an old Indian trail. It is ridged on one side and has a deep notch on each edge near the base. The base is obtusely pointed. It is but 3¾ inches long, and the edges are nearly parallel and quite sharp. It was found in 1894 by Mr George Slocum, its present owner, and is slightly twisted as a whole.

Fig. 49 has the outline of a pointed ellipse, rather obtuse at the base. One edge has one notch and the other two for attachment. It would have answered well for a knife and is as long as the last. It was found in the town of Venice, Cayuga co. in 1886.

Fig. 41 is another of these small spears, much thicker than the last two. It has a pointed base and opposite notches which are nearly midway in the edges. This was found on the north shore of Oneida lake June 12, 1886, on a point east of Big bay. The writer visited the spot afterward and found arrowheads and drills. The finder was Mr White of Geddes, then superintendent of schools, who soon disposed of it. It is not so distinctly ridged as some, but has the usual protuberances. The length is 3 inches.

Fig. 42 is from a drawing of a small spearhead in the state museum made by Mr R. A. Grider. It was obtained from the

collection of A. W. Allen, made on the east side of Cayuga lake. It is ridged, has a single notch in one edge and two in the other, one of the latter being midway. As drawn it is $2\frac{7}{8}$ inches long.

Fig. 55 is another of these short and broad forms. Below the notch on each side the edge projects into a kind of barb. The base is pointed and one surface ridged as usual. It is quite broad for its size, the length being $2\frac{3}{4}$ inches and the width 1 inch. It is in Dr D. S. Kellogg's collection and was found in the town of Peru, Clinton co. N. Y. Many articles of native copper have been found along the west line of Lake Champlain.

Fig. 41 is a longer spearhead with single notches on each edge, and a pointed base. It is slightly ridged on both surfaces, and is well finished. The length is slightly over $1\frac{1}{2}$ inches. This is in the Bigelow collection and was found near the Seneca river in Onondaga county.

There are many of the same general character which have an obtuse base. Fig. 11 differs from most of these, the base suggesting some yet to be described. The outline of this broken implement is much like that of some triangular notched flint arrows, and the surface is flat but has the usual lines on one side. It belongs to the writer and was found near Jack Reef, Seneca river.

Fig. 36 is a shouldered spearhead, without notches and with an obtuse base, which is in the Kellogg collection and came from Chazy. The base is a broad shank, slightly expanding near the end.

Fig. 14 may be either knife or spear, and is in the same collection. It was found at Plattsburg and, like the last, has no notches.

Fig. 65 is also in the Kellogg collection, and is quite large for this form, being $6\frac{1}{4}$ inches long. The other general features are much like those just described. This is from Plattsburg.

Fig. 68 is another slender implement in the same collection which was found on Valcour island in Lake Champlain. There are no notches and but slight shoulders. It is quite slender for the length, which is $5\frac{3}{16}$ inches.

Fig. 57 is in the same cabinet and was found at Schuyler Falls. It has a long broad shank, is distinctly shouldered, and quite irregular in outline.

Fig. 59 was found at Plattsburg and is in the Kellogg collection. It is distinctly ridged and has a notch on each edge near the base. The latter is obtusely pointed.

Fig. 16 closely resembles the last but is much larger. It was drawn by Mr Grider from a fine spearhead belonging to Mr W. B. Murphy of Schoharie county.

Fig. 34 is a fine spearhead found on the Randall farm near Saratoga lake and now in the state museum. The base is slender and pointed and the whole implement is narrow for its length, which is $7\frac{3}{8}$ inches.

Fig. 52 is in the collection of John Martin, Plattsburg, who says: "It was found when the new road was constructed past the United States army post at Plattsburg some 15 years ago. The place was on the right bank of the Saranac river some $\frac{1}{2}$ mile from the mouth." It is slightly ridged but is thin for its length, which is $6\frac{3}{16}$ inches. The shank is obtuse and it is moderately shouldered. Corrosion has turned it green. Mr Martin furnished fine photographs of his copper articles.

Three flat spearheads in the Waterbury collection and found together on the north side of the river at Brewerton, are of unusual character, and may be comparatively recent. No analysis of the metal has been made. They are quite flat, and are deeply notched at their broad bases, even more than one already mentioned. Fig. 71 shows one of these. There are a few striae, and the edges are sharp and beveled. The general appearance suggests a recent origin, with some peculiar features, but no age has been claimed for or assigned to them. Fig. 43 and 45 are the other two.

Fig. 20 is thus far unique in New York, though found sparingly elsewhere. It is a thick gouge, $2\frac{3}{4}$ inches long by $2\frac{3}{16}$ broad, having the sides turned into contracting flanges. The back is curved and the cutting edge abruptly beveled. It was found on the left side of the road from Port Byron to Howland island

near the Seneca river bridge. Some call this form a spud and it has been previously reported only from Wisconsin and Minnesota. It now belongs to Mr Harris of Rome N. Y.

Fig. 24 has an outline much like that of our modern knives. It is rare in New York but seems more common in Canada and elsewhere. It was found in Cayuga county and has a few of the usual raised lines. This is a good example of this form.

Fig. 78 is a much larger one in Mr W. L. Hildburgh's collection, found in Livingston county. His note is that "a meadow lark's wing was found bound on this." What evidence there is of this is not stated. Such knives have been found originally wrapped in fur, retaining traces and sometimes portions of this, for the salts of copper often preserved perishable articles.

There are many New York examples of native copper articles having a socket for the handle, made by turning up the edge. A fine example is in the Smithsonian collection, which was found in Tompkins county, N. Y. Fig. 2 shows this much reduced, the actual length being 9 inches. The socket is less artistically wrought than some and the back of the blade is rounded. It is quite thin for its size.

Fig. 13 is a very fine spearhead of this type, found near Seneca river, lot 75, Lysander, in 1893. It is in the Bigelow collection and is 6⅞ inches long. The back is ridged and the socket moderately expanded toward the base. The flanges are neatly turned inward and there is the frequent angle between the socket and blade against which the shaft abutted. The inside surface of the socket is perfectly smooth, as though the shaft had decayed within it. A lateral view of this is given and no better example has been found here.

Fig. 33 is another found on Wolfe island, opposite Cape Vincent N. Y., now in the collection of Dr A. A. Getman of Chaumont N. Y. The finder bored a hole in the base for suspension, but the writer omitted this misleading feature. The socket expands toward the base as usual and occupies nearly half the length of the implement. It is also depressed but has not so abrupt a shoulder as the last.

Fig. 37 is a very thin copper knife or spear of this type, found near Cold Spring on the Hudson and belonging to Mr James Nelson of that place. It is $2\frac{3}{8}$ inches long and $\frac{3}{4}$ inch wide with a perforation near the base. Not being symmetric it may have been a knife. If of native copper the hole would be an anomaly, but the figure suggests a recent article and Mr Nelson's note called it sheet metal.

Fig. 56 is of the same class, the flanges contracting more than usual in the outline sent by the owner, Mr W. T. Fenton of Conewango Valley N. Y. In a note on this article Mr Fenton said: "I have lived in this valley over 50 years but have seen but one copper arrowhead. Of that I send you outline of actual size. It was found in the town of Poland, Chautauqua co. Mr Larkin claims to have found some copper ornaments in a mound he opened a great many years ago, but if I remember right he sent them to the Smithsonian institution."

In his *Ancient man in America* Dr Larkin often speaks of native copper articles, without mentioning their final resting place. In a letter to the writer he says he thought he sent them to the Smithsonian institution or the Peabody museum. Nothing could be learned of them there and it is to be regretted that all have disappeared. His published statements may be quoted without comment, omitting minor matters:

In the year 1859 while exploring some tumuli in the vicinity of the Red House valley we found numerous singular and interesting relics, among which were spearheads 6 inches in length with double barbs composed of masses of native copper; also several blocks of mica which were in about the same condition as when chiseled from the granite of the Alleghany mountains. It was near this valley where was found one of the most interesting relics ever discovered among the works of the ancient inhabitants. It was a flat piece of copper, 6 inches in length by 4 in width, artistically wrought, with the form of an elephant represented in harness engraved upon it, and a sort of breast collar, with tugs on either side, which extended past the hips. The great amount of copper implements and blocks of mica that have been found, contradicts the theory of Mr Squire, that the tumuli located in western New York are not the work of the mound builders. I am satisfied, beyond a doubt, that

the Indian races never mined for mica or copper. neither did they bury either of these articles with the remains of their distinguished dead.—*Larkin*, p. 19

The circumstance of the Conewango and the Red House valleys being on and near the different routes to the southern rivers may be the cause of the lavish distribution of copper in those sections.—*Larkin*, p. 20

He gave an account of the demolition of a large tumulus in the town of Cold Spring about 1820, as told him by the old Seneca chief, Gov. Blacksnake:

Great quantities of relics, such as gorgets, flint axes, arrowheads, and a great number of copper implements artistically wrought from masses of native copper which was brought from the mines of Lake Superior, were found with the bones. . . So rich was this mound with decaying skeletons and relics of curious workmanship, that *now*, after more than 60 years have passed away, fragments of human bones, arrowheads and copper relics are found in large quantities at each successive plowing. In the spring of 1879, a few days after the ground had been plowed, in company with two boys we found 15 arrowheads, a curious piece of copper, and nearly a peck of fragments of human bones.—*Larkin*, p. 23

In speaking of Oil creek he said: "In the year 1861 I saw tools found in different places on the creek which were composed of native copper, one of which weighed several pounds. It was something like a drill, rather flat, pointed at one end and appeared to have been hardened."—*Larkin*, p. 81

Dr Larkin believed that the American elephant was tamed and used by prehistoric races. "Finding the form of an elephant engraved upon a copper relic some 6 inches long and 4 wide, in a mound on the Red House creek, in the year 1854 and represented in harness with a sort of breast collar with tugs reaching past the hips, first led me to adopt that theory."—*Larkin*, pref. The first quotation might imply that he had not seen this; the other that he himself found it. Those acquainted with native copper will at once conclude that some ingenious imposition was practised on him; one of those which every antiquarian sometimes encounters.

Fig. 47 is not so well finished as some of this type and the socket is square at the base. It is in the Bigelow collection

and was found on lot 42, Lysander, west of the village of Phoenix and Oswego river. The socket is short and the flanges rather low.

Fig. 48 is in the same collection, but came from near the Bay of Quinte, on the north shore of Lake Ontario. The finder unfortunately had ground down all irregularities. It is flat on one side, ridged on the other, with a square base. The flanges are parallel and much contracted and the socket is depressed, meeting the blade at a right angle.

Fig. 67 is a long and rather rude spear of this type, in the Kellogg collection at Plattsburg N. Y. where it was found. The socket is short and nearly as wide as the blade, with parallel incurved flanges. This kind of socket was used at a later day.

Fig. 66 is in the Kellogg collection, and was found at Clintonville in Clinton county. The general form is good but it seems unfinished. What should be the point has a broad protuberance and we might expect the removal of this in a perfect article. The shank is narrow and well worked, but is rounded at the end.

Fig. 51 is from the Martin collection in Plattsburg and was found about 2 miles northeast of that place on a sandy ridge at the head of Cumberland bay. Mr Martin's account follows: "The ridge referred to is wooded and was originally a long tongue of land between the bay and a river known as 'the creek,' whose course was artificially changed some 50 years ago. This implement shows lamination at the base. It is somewhat weathered and is green on most of the surface. A cross section is a square, except for about an inch from the point, where it is round." He called it a borer or awl and it may be compared with Mr Frey's shorter awl in fig. 17. This is very large beside that, being 7¾ inches long. It is a rare form in New York and the finest yet reported. The writer is much indebted to Mr Kellogg and Mr Martin for figures of their fine articles.

After describing the foregoing the writer obtained a few other illustrations from various parts of New York. For some of these he is indebted to Mr C. C. Willoughby, assistant curator of the Peabody museum, Cambridge Mass. Fig. 171 is a native copper

ax or broad gouge from Avon N. Y. given to that museum by Dr William Nisbert. This form seems more common in the Genesee valley and that of the Susquehanna than elsewhere. The general form is that of the ax, but the edge is slightly hollowed, as will be seen in one of the sections. Fig. 177 shows a piece of native copper given by Dr Nisbert and coming from the same place. It has been hammered into a rude celtlike form but has not been finished. Its importance is in this lack of completion, showing that some native copper articles may have been made here. Very few of such fragments have been found.

Fig. 173 is from an article entitled "The mound-builders," by W. L. Stone, in the September number of the *Magazine of American history*, 1878, p. 532. It is of a spearhead found in 1876, near the outlet of Saratoga lake and north of Moon's Lake house, by J. W. Coit. Fig. 174 is from the same article and is a figure of a similar but larger spearhead. This was found the same year by Horace Kelly, 2 miles up the lake on the Ramsdill farm. The point has been broken off. Both these slender spearheads have pointed tangs and are typical specimens.

In the same article Mr Kelly is credited with finding another fine spearhead at Ramsdill's cove on Saratoga lake. No description or figure of this is given but Mr Stone said it was tinged with red, apparently vermilion. If this were the case the article would be modern. Another curious find by the same person was a skull, colored on each side by verdigris. From this Mr Stone inferred the use of copper earrings. His article has some interesting statements and curious conclusions. Considering its sparse population the region about Saratoga and Lake Champlain has been unusually prolific in native copper articles. It is probable they were brought directly from Lake Superior, through the Georgian bay and Ottawa river to the St Lawrence, and thence into Lake Champlain. This was an early and well known route.

Fig. 172 is a fine and broad spearhead of native copper from a drawing by Mr Van Epps, made Aug. 1, 1901. It was found in Saratoga county many years ago and now belongs to William T. Becker of Schenectady. In this specimen the broad tang is quite short and by itself would have afforded a slight hold to the shaft.

This made necessary a notch on each side near the base. The reverse is flat and the ridged side is shown, with the usual green corrosion and hammered streaks so commonly found. He described these as a "threadlike veining of the copper, with a smooth, polished surface, though with a rich patina. In fact, this side of the blade is a vivid green of beautiful tint. The other side is smooth, unpitted, and blotched yellow and green." These are frequent features of these implements.

Two small axes or celts of native copper the writer found in the fine cabinet of the Athens historical society, Pennsylvania. Fig. 175 is one of these, belonging to Dr C. H. Ott of Sayre Pa. but found at Owego N. Y., like the next. It is symmetric and well wrought. A longitudinal section is given. Fig. 176 is another of these, more irregular and like an ax. It belongs to Mr Percy L. Lang of Waverly N. Y. Both are fine and in good condition. The writer learned of no other articles of native copper near the Susquehanna and Chemung rivers, the general range being farther north. Others will probably be found but to no great extent.

Mr Van Epps sent also a figure of a fragment of a native copper ax, "found on the ridge near Edmonds house on the Vlaie," in 1875. This is in the town of Broadalbin. It now belongs to Mr E. B. Markham, Northampton N. Y. The curved cutting edge remains, 2¼ inches wide, and the fragment is a little more than that in length. He also kindly furnished a statement of native copper articles found in eastern New York but not including Lake Champlain. He commenced his descriptions in February 1894, bringing them down to November 1901, and they embrace 10 celts or axes, nine lance-shaped blades, nearly all with tangs, and an interesting find of 135 beads. His account follows:

A brief description of the celts shows four found in the town of Glenville, Schenectady co. alone. Three were apparently surface finds; the fourth was from a grave opened by a steam shovel in a gravel bank, midway between Hoffmans Ferry and Schenectady. This was described in the *American antiquarian*, March 1894, p. 110. Some years later the interesting lot of native copper beads described below was obtained from another grave in the same bank.

One celt is recorded from the vicinity of Sharon Springs, Otsego co., one from Stuyvesant, Columbia co., the latter being in the collections of the New York state museum at Albany; and two others, found quite near the latter, in the town of Schodack. These two were found about the year 1893. Another, found near Glens Falls, is listed as lot no. 203 in the catalogue of the Wagman collection, sold in Boston by Woodward, in 1886. This measured $2\frac{1}{2}$ by $4\frac{1}{2}$ inches.

The tenth and last to be mentioned was found on a relic strewn sand spit, jutting northward into the great Sacandaga Vlaie near Northampton, "the Fish-house," Fulton co. This is a broken portion of the usual form of native copper celt, a fragment forming a triangle, whose sides measure about 2 inches, one being the cutting edge of the implement. The fracture, which is ancient, appears to have been made with great violence, for the fragment remaining is bent, showing the effect of a torsional twist or strain. This interesting relic was found in 1874 or 1875 and is covered with a fine green patina. All of the 10, as far as can be ascertained, are of the common rectanglar form, varying but little from the dimensions of the one from Glens Falls.

The lance-shaped blades, whether used as knives, spear or arrowheads, present a greater diversity of form. Of the nine blades listed five are from Saratoga county. The remaining four are from Warren county, two of which were found near Glens Falls, one from French mountain, Queensbury, and the last from the vicinity of Lake George. Modern territorial boundaries count for nothing in archeologic science unless based on some prominent natural division of land by mountain range or water, and so it will be seen by those familiar with these localities that the whole of the blades recorded were found in a very small area.

One of those from Saratoga county is a most beautiful example of the ancient American's skill in working native copper. It is now in the collection of William T. Becker of Schenectady N. Y. It is in absolutely perfect condition, is beautifully patinated in different tints, and has the unusual feature of a deeply notched base in addition to the usual tang, which however is very short. Its length is $4\frac{1}{4}$ inches and greatest breadth $1\frac{3}{8}$ inches. Two others of the blades listed, of the common variety with long tang, were described and figured by William L. Stone in the *American magazine of history* for September 1878. One is described by him as being bronze but this is doubtless an erroneous idea.

Closing the list of objects made by the aborigines from native copper is the find of beads numbering 135. This was made about midway between Hoffmans Ferry and Schenectady, at a gravel ridge in the town of Glenville, $\frac{1}{2}$ mile from the north bank of the Mohawk river. In opening this bank several graves have been

disclosed. The one containing the beads had no other relics save a few crumbling fragments of bone, while the grave containing the copper celt, but a few yards distant, yielded quite a store of fine objects, among which were an ornamented slate tube, some awls and a hook of bone, several hundred small perforated seashells, and a very fine doubly perforated boat-stone, made of cave alabaster. The 135 beads, varying from $\frac{1}{4}$ to $\frac{1}{2}$ of an inch in diameter, were made by coiling a pounded strip of native copper upon itself, and then by further dextrous beating bringing the lapped edge down to an almost perfect weld. Unfortunately for science this interesting find was scattered instead of being preserved intact.

On reviewing this list an interesting question is suggested. The indicated localities show that all described, with the exception of the celt from Sharon, are from the Hudson valley from Stuyvesant north to Lake George, and from the lower waters of the Sacandaga and Mohawk rivers. In fact every specimen listed, with possibly two exceptions, comes within the bounds of the ancient territory of the Mahikans or River Indians. Can we thus conclude that these were made and used by these Indians? Certainly, to my knowledge no native copper implements have been reported from any part of the Mohawk valley west of the localities mentioned. All of the numerous private collections of local material in the Mohawk valley, from Amsterdam to Utica, are absolutely barren of relics of this character. Triangular and conical arrowheads, rolled tubular beads, trinkets, etc. made from sheet copper and brass of colonial times, are quite abundant on castle and village sites on either bank of the Mohawk west from Amsterdam, but never an object of native copper has appeared. Garoga, Otsquago and Cayadutta, the three great Mohawk strongholds of precolonial time, with their myriad relics unearthed, tell us the same story—an utter absence of native copper.

In qualifying the above suggestive statement it may be said that the Palatine Bridge awl and beads are presumably of native copper, and that nowhere are native copper articles more frequent than in Clinton county near Lake Champlain. They seem everywhere to have been lost in travel and they are rare in the Mohawk valley because that was not a favorite route till the Mohawks came there late in the 16th century. Even then the river was little used west of Canajoharie for a long time.

Several of the articles mentioned by Mr Van Epps are illustrated in this bulletin, and can be compared with his account.

His ability and experience are well known, and these have been of great service in the present work.

Among the articles of native copper not figured here is one formerly in the state museum, from H. Van Rensselaer's farm near Ogdensburg. It is classed as a copper pickax. A fine triangular copper celt also belongs to the museum which came from Stuyvesant, Columbia co. One article of native copper was found on D. F. Shafer's farm, Schoharie. Mr Henry Woodworth of East Watertown has a fine spear of this material 4 inches long. A neighbor found a larger one which he unwisely polished. Mr W. P. Letchworth of Portage says: "I once had in my collection an ancient copper hatchet, excavated near Silver Creek N. Y. which disappeared in a loan exhibition held in Buffalo many years ago."

Copper implements have been reported at East Aurora, but most relics are recent there and these may be inferred to be the same. At the opening of the Cambria ossuary in 1823 copper and iron implements were found with flint arrowheads and pottery. Though of an early date the copper there was probably not native.

The Wagman collection was sold at auction in 1886. It was made up of articles found not far from Saratoga and in it were three of native copper. One was described as a combined spearhead and bodkin, probably a spear with a long and sharp tang. This was from Glens Falls and measured $6\frac{1}{2}$ inches by $\frac{7}{8}$ inch. An arrowhead from the same place was $4\frac{1}{2}$ by $2\frac{1}{2}$ inches, which is unusually wide for such an article. An elliptic and pointed spearhead was 6 by $1\frac{1}{4}$ inches. In the *Smithsonian report* for 1879, Mr N. Cole mentioned a native copper spear, found near West mountain, Warren co.

Copper articles were found in opening a mound in Mount Morris in 1835. These have since been reported as of brass, including brass kettles. Mr Hough mentioned a native copper chisel in Ellisburg, Jefferson co. Mr T. A. Cheney said, in describing a circular work and its relics on the east bank of the Allegany river:

Among these were spearheads some 6 inches in length with double barbs upon each side and formed from native masses of copper. . . Fig. 9 represents a copper arrowhead of fine finish which was disclosed within the inclosure. It is stated that spearheads, hatchets, etc. of iron, much oxidized by exposure, had been observed within this ancient work. None came to my notice.—*Cheney*, p. 49

The arrowhead represented is large but otherwise like those of European copper found on Iroquois sites of the 17th century. It is possible that native copper articles were found with this but Mr Cheney did not say he saw them. Others have reported modern copper arrows from forts on Cattaraugus creek, not found by them and therefore subject to doubt. They may have been used by the Eries in the 17th century.

Besides 135 tempered copper beads found in a grave 5 miles northwest of Schenectady, Mr Van Epps reported a native copper ax in the *American antiquarian* for 1894, found 20 years earlier. Fragmentary copper occurs in a few places. Most of the native copper implements now known in New York have been gathered within a quarter of a century and there may be many unreported now in private hands. Mr J. W. Nelson reported a fragment of native copper, 3 by 5 inches, with silver veins, from Deming's point, mouth of Matteawan creek, and a double-pointed knife 4 inches long. Copper spears have been doubtfully reported from Fredonia.

In the summer of 1901 Mr Lorimer Ogden, of Penn Yan, obtained a fine copper spear, 6 inches long, but no further description of this has been received, nor any notes of locality. The find is quite unusual for that section of New York, as such articles seem very rare in the lake region of the central and western parts of the state.

A fine celt of native copper was received too late for illustration, and is now in the Bigelow collection. It presents no unusual features, but has the black lines, corrosion and verdigris common to all articles of the kind. The general thickness is $\frac{5}{8}$ of an inch, gradually sloping on one side to the top, but more abruptly curving on both sides to the broad cutting edge.

One lateral edge is straight; the other curves, so that the width, which is $\frac{7}{8}$ of an inch at the top, becomes an inch at the center and $1\frac{1}{2}$ inches at the chisel edge. This edge is angularly curved, and quite sharp. Like most of the Bigelow articles it comes from the vicinity of the present owner's home, having been recently found near Three River Point, at the junction of the Seneca, Oneida and Oswego rivers. That part of New York has proved peculiarly rich in native copper, perhaps from its navigable waters and fine fishing grounds.

Among Canadian articles not yet found in New York is a native copper spike, found with two others and some copper beads on Wolfe island. It is pointed, slightly curved, angular, and has the head bent over so as to form an eye. This is $\frac{1}{4}$ inch in diameter and $3\frac{3}{8}$ inches long.

Another is a very slender one-sided spear or knife, with a tang, above which it has its greatest width of a little over an inch, tapering thence to the point. The other edge is 14 inches long. This came from St Joseph's island.

The most remarkable is a broad, thin, and much curved copper knife, the concave edge of which has 15 equidistant rounded teeth. It is a little over 13 inches long and nearly 3 wide. Part of the wrapper of beaver skin still adheres to it. This came from Midland City, the site of an old Huron town, giving it an age of at least 260 years.

In Wisconsin native copper articles much like the rolled arrowpoints of New York have been found, but they are heavier and the edges do not meet. The copper fishhooks there differ but little in appearance from the recent Iroquois forms. The copper crescents of that state are broad and curved plates, with sharp projections at each end of the concave edge. A similar ornament or implement in the national museum tapers regularly from near the center to each end and has no projections. It was found in Maryland and measures $8\frac{1}{4}$ inches from point to point. Another in the same museum came from Canada. This is wider, more curved, and is 8 inches across. A very slender tool in the same collection is also from Canada. It is $11\frac{3}{8}$ inches

long and the greatest width is at the base, where it is $\frac{7}{8}$ inch wide, tapering thence nearly to the point. Flanges extend halfway on each side.

Recent copper and brass implements

The New York aborigines were not slow to see the advantages of metallic articles of all kinds, whatever they may have had before Hudson's voyage. His account of their copper tobacco pipes may be compared with incidents in Gosnold's voyage a little before, along the New England coast. It is by no means improbable that some European articles had already found their way to them, but opportunities at once became greater. The Dutch soon followed Hudson's lead to the upper waters of the river, and early trade may be said to have commenced there rather than in the harbor of New York. We may dismiss the mythic Tawasentha council as far as the Iroquois are concerned. Their eastern boundary reached only the west line of Albany county, and the hostile Mahikans held the west bank of the river till Van Rensselaer purchased the land on both sides. It is quite likely the Mohawks soon contrived to trade on or near the river, but they had no treaty with the Dutch when Corlaer (Arent Van Curler) visited them in 1642, nor is there any evidence of any till 1645. Adriaen Van der Donck said: "In the year 1645 we were employed with the officers and rulers of the colony of Rensselaerwyck in negotiating a treaty of peace with the Maquas, who were and still are the strongest and fiercest Indian nation of the country; whereat the Director general William Kieft on the one part, and the chiefs of the Indian nations of the neighboring country on the other part, attended." The Mahikans had then removed to New England.

Preliminary to this first formal council with the Mohawks, Corlaer said in 1642, he "brought presents there, and asked that we should live as good neighbors, and that they should do no harm to either the colonists or their cattle, to all of which the savages at the three castles gratefully agreed." Three years later the treaty was made. The Mohawks of the first castle may

have referred to Corlaer's informal visit when they said, Sep. 24, 1659: "Brothers, 16 years have now passed since we made the first treaty of friendship and brotherhood between you and all the Dutch, whom we then joined together with an iron chain. Since that time it has never been broken either by us or by our brothers and we have no fear that it will be broken by either side."

It would be easy to bring other proof that this supposed early Tawasentha council with the Iroquois was never held, but the practical fact remains that Indian trade began at Fort Orange or Albany, and that it speedily penetrated farther. The Minquas, or Susquehannas, lived on the lower waters of the Susquehanna river and were kindred to the Iroquois. They were visited by Capt. Cornelis Hendricksen, who made a report of his discoveries, Aug. 18, 1616. Among other things, "he also traded for, and bought from the inhabitants, the Minquaes, three persons, being people belonging to this company; which three persons were employed in the service of the Mohawks and Machicans; giving for them kettles, beads and merchandise." It has been reasonably supposed that these Dutch traders among the Mohawks were taken prisoners by their enemies, the Minquas, and that on their knowledge of the country the maps of 1614 and 1616 were partially founded. Farther we know not.

War between the Mahikans and Mohawks interfered with the Albany trade at times and in these hostilities the Dutch became involved in 1625. The commander at Fort Orange assisted the Mahikans, but the Mohawks beat the combined party and killed him and six of his men, cooking and eating one of them and sending portions to their villages to show they were superior to the white men. Yet the Mohawks bore no malice. Peter Barentsen visited them a few days later and they said they would not have injured the Dutch had they not meddled with them. After this hostile episode there was no farther trouble.

The Dutch did not at once sell guns to the Iroquois and were shrewd enough to withhold them from the River Indians when furnishing the others, but whether they sold arrowheads to both

may be a question. The arrowheads found with other things in an Indian grave at Fall River, on which Longfellow founded his well known ballad, are precisely like those found on most recent Iroquois sites. These are generally a long triangle with various other features. For convenience those of iron will be placed with them here. Most of these are cut from thin sheet iron or brass, commonly with perforations by which they were securely bound to the shafts. Parts of these often remain, having been preserved by the salts of the copper. As shreds and large fragments of sheet copper are frequent on Iroquois sites it is probable that many arrowheads and ornaments were made on the spot. Sometimes an old brass kettle was used in this way.

Fig. 46 is a long spearhead from Cattaraugus creek, made from an old brass kettle. At the base the edges are rolled over so as to form a socket. This is the largest the writer has seen.

Fig. 6 comes from Cayuga county and is reduced in size. It is made of sheet copper and is $1\frac{3}{8}$ inches long. There is a perforation by which a part of the shaft remains attached by sinews. Fig. 70 is an unusually long and rather rough copper arrowhead from Indian hill, Pompey. This was the town of 1654, and these triangular arrowheads have been frequent there. It was occupied till 1682. This is unperforated. Mr David Boyle calls these ghost arrows.

Fig. 82 is in the collection of Mr W. L. Hildburgh and was found in Oneida county near Oneida lake. It is of rolled copper, pentagonal, with one perforation and another begun. This form is rare. Fig. 83 is similar but longer in proportion and has a very small perforation midway. It is in the same collection, and from Livingston county. Fig. 84 is in the same cabinet, and has a stem, rather a rare feature in this class. This is from Oneida county.

Fig. 63 is a triangular arrowhead with indented and undulating base. It is not perforated and comes from Indian Castle, north of Watervale, where copper arrowheads have been abun-

dant. This was occupied in 1677. Fig. 103 is a long and perforated triangular arrowhead, also from Pompey. Fig. 111 is of a different character, being of yellow sheet brass, stemmed and barbed and with notches in the edges. This is from the fort south of Pompey Center, occupied about 1640.

Fig. 117 is from Cayuga county and was found in 1888. It has no perforation but part of the shaft remains attached, being bound below the metal. Mr W. W. Adams, the finder, called it a brass arrowhead.

Fig. 113 is of copper and from the Sheldon fort, lot 69, Pompey, probably occupied about 1630. It differs from most in having the two long edges slightly convex. Fig. 129 is one of three triangular arrowheads found by the writer at Indian hill, Pompey, in 1886. This is perforated but the others are not. Fig. 133 is of rarer material, being of thin iron. It is triangular, with indented base, and having one of the long edges irregular. This came from Indian Castle, Pompey. Fig. 134 is from the same place and is of copper. The perforation is central and long, and the ends of the base have a slight upward curve. Fig. 140 is a long triangular brass arrowhead from the fort south of Pompey Center, having convex edges. Most of the articles from this site are in the Vail collection.

Fig. 141 is a brass arrowhead from an Oneida village site near Munnsville, Madison co. It has a sharp angular indentation in the base and another in one lateral edge. Fig. 142 is another of sheet brass, found in 1879 east of the Oswego river at Phoenix. It is barbed and stemmed.

Fig. 143 was drawn from one taken from a grave near Amsterdam N. Y. and in the possession of Mr Le Grand S. Strong. It has an indented base and a square perforation. This is unusual though not unique. Mr Grider gave the same feature to two others. Fig. 144 is one of these, from the same place, and differs from the last in its pentagonal form. Fig. 159 is the third of these, and is much larger than the others.

Fig. 157 is a large and fine brass arrowhead, stemmed and barbed. It is from Stone Arabia and is in the Richmond collec-

tion. Fig. 160 is a copper arrow with angularly indented base, and is in the same cabinet. It was from the Nellis farm near Palatine Church, and with it is a larger one with slightly indented base. Fig. 164 is a triangular brass arrowhead from the Sheldon fort, Pompey. This is not large, and the base is convex. Fig. 58 is from the same site and like the last.

Fig. 149 is another triangular arrowhead from Indian hill, Pompey. It has a central perforation and an indented base. Fig. 150 is from the same site and is similar except in having a straight base. Fig. 152 is a large triangular arrowhead, one edge of which is convex. The perforation is central. It is from Happy hollow, west of Canajoharie. Fig. 153 is a narrow triangular arrowhead from Indian hill, Pompey. The base is slightly convex.

Fig. 86 is a very neat little brass arrowhead, found near Oneida lake, and of unusual form. There are slight notches in the lateral edges of the sloping base and the cutting edges are a little convex.

Fig. 151 is of quite a different type. There is a short stem with an expanded base, and the shoulders are almost barbs. The lateral edges are beveled and sharp and there are several long incisions on the flat surface. The point is broadly rounded, and it may be one of the later steel arrowheads. It is in the collection of the Onondaga historical association, but without locality. Fig. 54 has a similar base, is of iron or steel, and not unlike the last in general character. It is beveled from the center and there is a large perforation on each side above the shoulders. The edges of these have been hammered down. It was found at Baldwinsville in 1880 and is in the Hamill collection. Fig. 184 is a fine and curious iron arrowhead, with notches. It is in the Coats collection and from the Onaghee site.

There is another class of recent copper arrowheads barely separated from ornaments. A triangular and rather long piece of sheet copper was rolled into a slender cone. If it was to be used as a bangle, with a tuft of colored hair inserted, the narrow

point was left a little open for suspension. If an arrowhead was desired, it was rolled tightly so as to make a sharp point. Fig. 85 shows one of the latter, in the Hildburgh collection, which has part of the slender shaft remaining. It was found in Livingston county, where the form is frequent. Fig. 148 is another, belonging to G. W. Chapin of Fonda N. Y. and was found on Briggs creek, north of the Mohawk river. The writer has seen many on the Pompey, Owego and Cayuga sites, and they abound in Ontario county. Fig. 183 is a fine example, recently found at Indian hill in Pompey.

In these selections from a great number of specimens and figures, it will be seen that the Iroquois changed the material but not the form of the arrowhead. Probably nine out of 10 are simply long triangles, the favorite Iroquois form when they used stone. The rolled and cylindric examples do not differ much in form from the earlier ones made of horn. Those with stems are everywhere rare, and some were not made by the Indians, but sold to them or given as presents. Most persons are familiar with the iron arrowheads used by our western tribes but they are hardly a new feature of savage life. Some Abenakis came from New England to visit Count Frontenac in 1691 and proffer him their aid. In reply he told them they might have all the iron arrowheads they could carry away. This shows he had a constant and abundant supply.

Brass kettles

The earthen pot survived the coming of the brass kettle for a generation, for poor Indians could make the former when unable to buy the latter. The advantages of the metallic vessel were too great, however, to be foregone except in case of need. It was light, durable and convenient, and was at once a favorite. Even to the happy hunting grounds its spirit could go with the Indian warrior. Hence came a curious custom among the Hurons of Canada, always in early days noted as thieves. The articles were valuable and the graves might be robbed. The safeguard was to cut a hole in the bottom with an axe, which

ruined it for earthly use but not for spiritual. Nearly all Canadian vessels of that period are thus marred.

It was not so in New York. Fragments of vessels are found, but an incredible number of perfect ones have been exhumed, many of which afterward did faithful service in the kitchens of pioneers. In graves they often contain traces of food, charred corn, dried grapes, chestnuts, raspberry seeds and other things.

Large vessels might be used in villages, but travelers preferred those which were small and light. For convenience these were sometimes placed in caches or hid in trees. Thus, when Cammerhoff and Zeisberger were at Skaneateles July 21, 1750, they said: "There we found the kettle which we had concealed when we passed here the last time."

The lack of this kettle, while at Onondaga, gave them occasion to note another use. A war party was about to set forth and on the evening of July 11 they were invited to a farewell feast:

> The repast was held in the house of the chief and all was conducted in a very ceremonious manner. Every one brought his kettle. The chiefs sat together and our seats were in the midst. After the usual ceremonies the meal was served by two servants. They had boiled a whole pig with Indian corn and the servants continued helping the guests until the supply was exhausted. As we had no kettle or dish, they furnished us with a kettle and filled it very full. We were still hungry from our long fast and ate the food with great relish. When we had emptied our kettle they filled it again and we took it home with us.—*Cammerhoff*

At the 10 days dead feast and other like occasions, the Onondagas still carry home parts of the feast in their tin pails, but they do not now eat from them. In old times it was customary for all to carry their bark dishes and wooden spoons. When Conrad Weiser and John Bartram were at Onondaga in 1743 the latter gives the impression that the feast was more in common. He said: "After 4 o'clock we all dined together upon four great kettles of *Indian* corn soop, which we soon emptied." A few days before Weiser was at a feast with 18 Onondaga chiefs. Several songs opened this, followed by the emptying of a two gallon keg of rum in mutual healths. "After that the

kettle was handed round with a wooden spoon in it; every one took so much as he pleased." This may have been placed in his own small kettle.

In 1684 La Salle wanted 2000 pounds of small brass kettles at Fort Frontenac, costing 1 livre, 5 sous, a pound. These would sell for 4 francs a pound, yielding a great profit. The English and Dutch sold these also but included them among presents. In 1693 Gov. Fletcher gave the Mohawks 24 brass kettles for cooking to replace those the French had destroyed in February. Some of 2 or 3 pounds weight were among the presents of the following year. They prized small brass kettles but large ones were needed for public occasions. When Schuyler and Livingston came to Onondaga in 1700 the Indians, "according to their custom, hung over a great kettle of hasty pudding made of parch'd Indian meal, and sent it us." The great kettle is now of iron but is still a feature of New York reservation life.

As one feature of public gatherings and great occasions the kettle became symbolic. When Frontenac was preparing to invade Onondaga in 1696, he spoke to his friendly Indians about "the Great Kettle from which the whole world will take what it wants to keep alive the war unto the end. Be not impatient; that Kettle has not yet boiled; it will boil soon. Then will Onontio invite all his children to the feast and they will find wherewithal to fill them. The tears and the submissions of the Iroquois will no longer be received as in times past. They have overflowed the measure; the patience of the common father is exhausted; their destruction is inevitable."—*O'Callaghan*, 9:645

Dablon described the general war feast at Onondaga in chapter 10 of the *Relation* of 1656, and part of this is quoted here:

We saw in the latter part of January the ceremony which takes place every winter in their preparations for war, and which serves to stimulate their courage for the approaching conflict. First of all the war kettle, as they call it, is hung over the fire as early as the preceding autumn, in order that each of the allies may have the opportunity to throw in some precious morsel to be kept cooking through the winter; that is to say, in order that they may contribute to the enterprise which they are planning. The kettle having boiled steadily to the

month of February, a great number of the hunters of Sonnontouan (Seneca) and of Oiogoen, (Cayuga) having repaired hither, made the war feast, which lasted several nights. . . . The Father (Chaumonot) was invited to put something into the kettle to make it better. He told them that that was certainly his desire; and accommodating himself to their customs, he assured them that the French would put some powder under this kettle, which pleased them greatly.

To upset this kettle was to abandon warlike plans. To boil the flesh of an enemy in it was often metaphoric, but much more frequently literal. William L. Stone quotes from Ramsay's *History of the revolution* a passage apparently referring to Guy Johnson's council with the Indians at Oswego in 1775:

Colonel Johnson had repeated conferences with the Indians and endeavoured to influence them to take up the hatchet, but they steadily refused. In order to gain this cooperation, he invited them to feast on a Bostonian and to drink his blood. This, in the Indian style, meant no more than to partake of a roasted ox and a pipe of wine at a public entertainment, which was given on design to influence them to cooperate with the British troops. The colonial patriots affected to understand it in its literal sense.—*Stone*, 1:88

It may be noted that Was-to-heh-no is still the Onondaga name for the people of the United States, being the nearest approach they could make to pronouncing "Bostonian" a century ago. The figurative use of many terms has been often explained but the early Iroquois had a well founded reputation for cannibal tastes. The eastern Indians called them Man-eaters.

Though the subject of cooking and serving meals is connected with that of the utensils employed, a bare reference may serve here. Not much time was wasted in preparing food till those later days when the kettle was always over the fire. Some ate directly from this; others used small kettles, bark dishes and wooden spoons. Indians had their changing and local fashions even as we do. Their few vegetables and abundant game gave them all the variety they required. Greatly prized were the three supporters of life, corn, beans and squashes, and of these they have pretty stories to tell. In agriculture the colonists learned some useful lessons from them, and the French mis-

sionaries preferred meal ground with the wooden pestle and mortar to that from their own hand mills. In plentiful times they reveled; in times of dearth they ate anything they could. In Indian corn they left a priceless legacy to the land.

A few illustrations of brass kettles will be given, as well as of some parts. They were serviceable after their original use was gone, being formed into arrowheads, knives, saws and ornaments of many kinds. Examples of some of these secondary uses will be given.

Fig. 158 is a much reduced figure of one out of many kettles found in Cayuga county in 1885-86. Fig. 155 is another of actual size, in the collection of Mr C. F. Moseley, Bergen N. Y. It is from Honeoye Falls, where many similar ones have been found. Fig. 147 is another from the same place, of actual size. The ears are of different forms. This one is in the Dann collection, is not corroded, and is in fine condition. Another, much like this, is from the same place, and now in the state museum. It is $5\frac{3}{4}$ inches in diameter, and almost 3 inches deep. One with it is an inch wider and a very little deeper. One found 3 feet underground, at the junction of Wood and Fish creeks, near Oneida lake, has a top diameter of $5\frac{1}{2}$ inches, bottom $4\frac{1}{2}$ and a depth of 3 inches. This was much corroded. The rim was rolled but not wired, and the ears for the bail were cut out and riveted in place. It was close to the face of a skeleton and bottom side up. Other relics were found several feet deeper, but the shifting sand made the original depth doubtful.

Brass tobacco boxes were among the presents of 1694, and these are occasionally found. They are circular and flat and were sometimes used to hold paint. Tomahawks are frequently made of brass, with a steel edge.

While most of a broken brass kettle could be used, the ears were not available, and so are sometimes found in a perfect condition but detached from the vessel. Fig. 128 shows one of these which forms a thick loop, with the ends riveted to the vessel. This is from Indian hill, Pompey, where this form is common, and is of actual size. Fig. 156 is also of actual size, the rivets

remaining. It is made of a flat plate of brass about as thick as the kettle, inside of which it was placed. The corners of the plate are bent over. This is from the fort south of Pompey Center, making it 15 or 20 years older than the last.

Copper spoons are rather rare, the Indians preferring the wooden ones which they made with so much taste and skill. Fig. 137 was drawn by Mr R. A. Grider from a large copper spoon belonging to Mr D. I. Devoe of Fort Plain N. Y. It was made from part of a kettle, and was found in a grave. Fig. 138 is a profile view of another made of pewter, and fig. 139 is a full view of the same. The form is much like that of the wooden spoon but lacks the ornament at the top of the handle, which is bent over. This was found in a grave in Cayuga county with a pewter mug containing 44 French coins, dated from 1642 to 1656. Some of the earlier dates may be doubtful.

Fig. 131 is a flat copper spatula, found on the Odell farm, lot 3, Van Buren, on the south side of Seneca river. It has been hammered into shape, and is rather smooth. This may have been once nearly on a plane but is now considerably bent. Fig. 163 is much like the last in outline but has a longer handle, thickened at the end. It is of iron and was found in the town of Fleming in 1887.

Among the presents recommended for the Five Nations in 1694, were "50. Brass Kettles of two, three, & four pound a p^ce^ thin beaten and light to Carry when they go a hunting, or to war if the Continue."—*O'Callaghan* 4:126. The high value the Indians placed on "small brass kettles" was noted in 1696. Among the presents of that year were 30 small and 14 large kettles.

For trade purposes they were often brought to the Indians in graded sizes. Mr J. V. H. Clark mentioned some thus arranged in Pompey. "Mr David Hinsdale found a *nest* of brass kettles, the largest of which would hold two pails full, and the smallest about three pints. They were all bailed, ready for use, and some of the smaller ones were used in Dr Western's family and Mr Hinsdale's family for several years. The larger ones,

being on the outside, were considerably corroded by time and exposure and were unfit for use."—*Clark*, 2:260

Squier mentioned a curious burial around a kettle, which may be credited to the Neutral nation. A large number of skeletons were found together in the town of Black Rock. "They were arranged in a circle, with their heads radiating from a large copper kettle which had been placed in the center and filled with bones. Various implements both of modern and remote date had been placed beside the skeletons."—*Squier*, p. 100

The brass kettles which he describes and figures from the Canadian ossuaries are quite different in some respects from those of New York. The ears and bails project far out from the sides in a very clumsy way and the kettles held from 6 to 16 gallons. As these were undoubtedly French, those of New York may show the prevalent English and Dutch forms in the 17th century.

Metallic pipes

Roger Williams's statement has been given regarding the quickness with which the New England Indians learned to cast metals, even in the form of pipes. Their ability to cast brass may be doubted. When the writer was a child every hunter cast his own bullets, and he has done the same. Bullet molds occur on Iroquois sites 250 years old. Like things were a part of household economy. In the general Bigelow collection is a mold for casting pewter spoons, much in use in pioneer days by those who could not afford silver, then a foreign commodity. Were the old spoons bent and battered? They went into the ladle and mold and came forth in pristine beauty.

Though Hudson said he saw copper pipes in New York in 1609, none of these are known, nor are metallic pipes common. Those found on Indian sites were probably made by white men. Pewter and lead were easily melted; not so iron and brass. So bars of lead were often given to the Indians at treaties and are sometimes found on their village sites. These were mostly used for bullets, but some were formed into rude ornaments, to be noted later. In case of necessity the lead ornament or pipe might take the form of balls for the gun.

Fig. 79 is the bowl of a pewter pipe in the Hildburgh collection, found in Livingston county. The bowl is cylindric and it has a broad and thin rim. Another as broad again, with a wood and copper bowl, is in the same collection, but is almost destroyed. This is from Oneida Valley, whence comes another of the same materials and in fair condition. This has an expanding bowl with raised angles.

Fig. 80 is a slender trumpet-form pipe of brass in the Richmond collection, found on the Briggs farm, town of Mohawk N. Y. Fig. 104 is a large and rude iron pipebowl from the Rose hill farm in Seneca county, on the east bank of Seneca lake. It has a projecting rim and is angular.

Fig. 127 is a curious angular lead pipe in the state museum, with a bold platform projection in front of the top of the bowl. This was obtained by Mr J. S. Twining in Jefferson county. Fig. 130 is a massive pipe of pewter or lead and of simple form, found in the town of Schroeppel, a little north of Oneida river. The edge of the bowl has been battered. Fig. 145 is a fine but short lead pipe, found near the surface of the grave in Fleming where the pewter mug was obtained. Fig. 146 is an equally fine pipe of the same material, found in Rome N. Y. The stem is quite slender.

Fig. 132 is an iron pipe of modern pattern, found in the town of Scipioville. It is partly brazed, and but 5 inches of the long stem remain. Fig. 136 is a fine pewter pipe, found near Mapleton, on the site of Upper Cayuga. Part only of the stem is shown here, but the extreme length of the pipe is 9½ inches.

Fig. 182 is from Oneida Valley and is in the Hildburgh collection. The owner describes it as made of copper, pewter and wood. The form is unique. Fig. 181 is a fine example of a small iron pipe, found in Jefferson county and belonging to Dr Getman. It is well made and preserved, and has a knob at the bottom of the bowl and the end of the stem. The stem is but little longer than the bowl.

Fig. 180 is a reproduction of one sent the writer by Walter C. Wyman of Chicago, and represents an interesting relic of two

prominent men of New York. It is of silver with the simple inscription on the bowl: "Presented by Governor Tompkins to Skenandoah." De Witt Clinton visited the old chief at Oneida in 1810 and said: "He is entirely blind but his hair is not gray. He smokes, and can converse a little in English. He was highly delighted with a silver pipe that was given him by Governor Tompkins." The latter filled his office from 1807 to 1817, and the pipe is now nearly a century old. Mr Wyman said: "The lettering is very much rubbed but is legible. The pipe was obtained with the wampum belt of the Oneida treaties, directly from old Skenandoah, the chief of the Oneidas in Wisconsin, who died three years ago. He was the grandson of the owner of the pipe and was about 90 when he died."

Mr Jeptha R. Simms describes another of these New York silver pipes in the following words:

Oct. 28, 1867, I had a visit from Rev. Robert Jones Roberts, a young English missionary to the Six Nation Indians at Newport, province of Ontario, Canada. He was accompanied by G. H. M. Johnson—On-wan-on-shy-son—one of the principal Indian chiefs of that province, who claimed to obtain his name by descent from Sir William Johnson. . . He carried with him a pipe which had descended through several generations of sachems, and had become among them an evidence to its bearer of his dignified position. On the plate under its stem, next the bowl, was engraved the history of its origin, reading upon the right side, from the mouth, "As a testimony of their sincere esteem;" and on its reverse, "To the Mohawk Indians, from the Nine Partners of the tract near Schoharie, granted in 1769." This pipe is of pure silver and weighs four ounces avoirdupois. It is of goodly proportions, with a bowl 2 inches deep; from which the stem measures 18½ inches. An ornamental plate, perhaps an inch wide, extends 5 inches from the bowl, bearing the inscription above named. From this plate to within 4 inches of the end of the stem, is a small silver chain. On the front of the bowl stand the figures of a white man and an Indian, holding a chain in their right hands; the latter having in his left hand a pipe from which he is smoking. This relic is sacredly treasured among the Indians.—*Simms*, p. 43

Mr Simms gave a good figure of this interesting article. The Schoharie valley belonged to the Mohawks, and the original Nine Partners' great and little patents were in Dutchess county,

and dated in 1697 and 1706. These partners were not the same. Several patents of Otsego and Schoharie lands were made in 1769.

After the above was written the writer figured a fine pewter pipe belonging to Mr Addison Pease of Fleming, and found at that place. It is of a modern form, with ample bowl and in good condition.

More of these might be shown, but they differ little in form, even when combined with wood or stone. Such combinations were frequent. In a paper in the *American antiquarian* for 1879 Mr Edwin A. Barber figured several Dutch and Swiss iron pipes and a rude copper pipe from Pennsylvania. He also quoted a statement about the pipe of Capt. Miles Standish, used by him till his death. It was "a little iron affair of about the size and shape of a common clay pipe." Mr Barber thought this was made in Holland. Those in New York may be over 200 years old. This eminent authority concludes "that we have no positive proof that pipes were in use in Europe before the Columbian discovery of America; but if it can be shown that such was undoubtedly the case, it is reasonably certain that such objects were employed in medicinal remedies or for purposes of fumigation."

It was customary to present large quantities of pipes at Indian councils. Among the presents in 1696 were "1 grose of tobacco pipes, wood & tinn," and sometimes casks of pipes were given. The study of European pipes used by the Indians of New York has proved of much interest. They came in at quite an early day.

Trade axes

One of the earliest iron implements that found its way into the interior of New York is known as the trade ax. It usually has a broad edge for cutting, but is narrow below the socket for the handle. This was made by bending over the upper part of the flat iron plate, forming an elliptic opening. They are of all sizes, and quite frequently are stamped with three circles, each inclosing a cross. Sometimes the cross has a sec-

ond bar. The circles vary from one to three, never exceeding the latter number. Many are unstamped. They occur in large numbers in some parts of Canada and New York. Hundreds have been found on Cazenovia creek in Erie county. Large numbers on Cattaraugus creek, near the lake, kept the early blacksmiths supplied with good material, and Mr Obed Edson recorded large finds in Erie and Chautauqua counties. Several hundred pounds of these were found on M. B. Crooks's farm, 2 miles from East Aurora. Miles Bristol paid for two years tillage of his orchard lot with the axes he found at the village of Lima. In another place enough of these were obtained to equip an early sawmill, and Cayuga, Madison, Onondaga and Ontario counties have been equally prolific. After a century's gathering the crop is not exhausted. Squier said of these: "Thousands are found in the western counties of the state."

Their early introduction has been already noted, Champlain seeing them here in 1609. One or two have been found near the prehistoric fort in the town of Minden, but not of late years at least within the wall. Squier said that brass kettles and European articles were found inside the bank, but this is usually thought an error. In another place the evidence is clearer, and fig. 87 is probably one of the oldest to which a date can be given. It is 7 inches long and is stamped with two circles of unusual character. The cross is not of the common type, and there are very small circles in three angles of the limbs. This is in a collection at Cazenovia N. Y. with another much larger, and regarding both Mr J. T. E. Burr writes: "The iron axes are from the fort on the Nichols farm, on the Mile Strip in Fenner. I know when they were found, and assure you they are genuine and properly located." The larger one is 8 inches long, with a cutting edge of $4\frac{1}{2}$ inches. It has three circles close together but each cross has a double bar. The socket is bent and broken.

It is probable these were used in the siege of the Oneida fort in 1615 but whether they were brought by Champlain's Indians or already owned by the Oneidas is conjectural. The

latter removed their town soon after, and when Corlaer visited them in December, 1634, a chief told him that "the Frenchmen had come thither to trade with six men, and had given him good gifts, because they had been trading in this river with six men in the month of August of this year. We saw very good axes to cut the underwood." They saw razors also.

In this case it is quite probable that by the river they meant the St Lawrence, rather than any stream in the country of the Oneidas. It was easy to misunderstand.

In the pictures accompanying the account of the nine Iroquois tribes or clans in 1666, the Turtle and the Beaver carry the typical trade ax, but the Eagle has a hatchet expanding equally on each side. Wooden clubs were at first called tomahawks, but after a time axes were known by this name. Taking up and laying down the hatchet became terms for war and peace, modified to suit the occasion. According to Colden the expression was enforced by acts at times. He relates the proceedings at a council in Albany in 1684. Speeches and explanations had been made to avert hostilities. "Then the axes were buried in the southeast end of the courtyard, and the Indians threw the earth upon them." The council was really held in 1681.

When war was unsuccessful the Indians said the ax was poor or broken, and some battles have been known by this name. Axes were figured on or attached to war belts. In 1692 Tataconicere, an Oneida at a French mission post in Canada, learned that the wife of the Onondaga chief, Black Kettle, was trying to escape. He at once killed her, and "struck his hatchet into the gate as a sign that he would not grant pardon to any one." Old documents and speeches are full of these symbolic uses.

In his camp at Onondaga lake, July 2, 1756, Sir William Johnson made a remarkable speech of this kind to the Indians assembled there. He had advised them to return the French hatchet and had sharpened their own by a belt. To this they had made a suitable response and waited his further pleasure. He said:

Brethren—two days ago you returned me thanks for sharpening your own Hatchet and said you had found mine last year at Oswego was not good. I told you then that I had some weapons

with me that were sharp likewise if properly made use of and I hope you will make use of them vigorously and our common enemy As your Hatchet is now sharp. I likewise sharpen your knife to cut our enemys throats or take their scalps off, and as I know it is an old custom amongst you to feast on your enemies flesh I present you those Kettles for that purpose. [This is meant figuratively, and some Meat is boiled in the Kettles, which they eat and call it French Mens Flesh, so when drink is given it is called blood of their enemies.]—*O'Callaghan*, 7:149

There was much profit in selling these implements. La Salle gave an account of trade at Fort Frontenac in 1684, with general demands, cost and profit. He wanted 1000 axes, which would cost 7 or 8 sons a pound and would sell for 30 sons apiece. They were prized as presents and Schuyler gave the Iroquois 300 hatchets in 1708. Metallic implements made blacksmiths necessary to the Indians and it became a matter of political importance whether the blacksmith was English or French. Old anvils have been found on village sites, the possession of which was matter for stratagem or debate two centuries ago. A few words on this may be of interest.

As the Iroquois increased their use of guns, axes and kettles, they more and more required the aid of smiths. The Mohawks could go to the white settlements, but this was too long a journey for the others. So, at a council in Albany in 1691, they renewed a previous request, saying: "We did formerly desire that we might have a Smith at Onnondage, whereupon a young Man that was a Smith by Trade, was sent us, and we gave him 20 Beavers for his encouragement to stay, but is gone away; again we request that we may have a Smith to mend our Arms, it being somewhat dangerous to come downe for every trifle hither, & we desire also that the Smiths here may in the meantime work as cheape as they did formerly."—*O'Callaghan*, 3:775

On behalf of all in 1692, Oheda, an Oneida chief, said, "We desire the blacksmith's Anvill that is at Onondage may remain there, and that there may be a Smith permitted to goe and live there for the mending of our arms, and not to goe away againe so soon as they have Traded, as the other Smith did."—*O'Callaghan*, 3:844

This may have produced but little effect, and, Feb. 25, 1693, the Onondaga speaker said to Gov. Fletcher: "Wee desire that yo^{r} Excellency would be pleased to ord^{r} a Smith to bee with us in o^{r} country to repair our armes that wee may defend ourselves against the French." Fletcher replied: "I doe grant yo^{r} request of a Smith, and will order one to live in yo^{r} country to repair yo^{r} armes."—*O'Callaghan*, 4:23

He was not so swift as his Indian name implied and they renewed their request July 4, 1693, with an addition. "Wee begge of you to lett us have a Smith & a gunn stock maker in our Castle to mend our armes when theyare broaken."—*O'Callaghan*, 4:43.

In 1700 the French offered to furnish smiths to mend their axes and guns. Some years later this led to a conflict of interests in the Iroquois capital, concerning which Father Jacques d'Heu wrote from Onondaga, May 24, 1708:

The English blacksmith has returned after nine months absence. On his arrival those of the French party were not willing to give him the anvil which belongs to them, and concealed it at my house and requested that a smith be sent from Montreal. That matter, I told them, would be discussed on M. de Joncaire's arrival. It seems to me that it would be very important for the good of religion and the French Colony, were there a French blacksmith here; the Englishman would then decamp. But this Blacksmith should be under the Black Gown and an exemplary man. One Donné would be our man, but I see no prospect of him. The anvil was given to the English blacksmith, because those of the English party were beginning to mutiny. But I'm told that if a Blacksmith came from Montreal he would get at once the anvil and all the tools belonging to those of the French party.—*O'Callaghan*, 9:816

There were afterward French smiths among the Senecas, but they did not remain long. It became a part of the New York policy to see that a reasonable number of its own blacksmiths were provided. Seldom have they been of such political importance.

In 1742 it cost £21 7½d to set up the bellows, anvil and vise at Cayuga, of which New York bore the cost. So it was proposed to the colonies of New York, Massachusetts and Connecticut, in

October 1747, "that a gunsmith be sent to each of the tribes following, viz: The Oneidas, Onondagas, Cayugas and Senecas, and two men with each gunsmith, to continue until next spring, and that goods valued at £360, New York currency, be sent with them."

In the laws of the colony of New York mention is frequently made of these blacksmiths. By order Cornelius Van Slyck jr and company resided in the Seneca country, Sep. 1, 1741, to Sep. 1, 1742, mending arms, etc. to prevent French plotting. About the same time Peter Lansing and Barent Staats jr were four months in the Cayuga country on the same business. In 1745 Garrit H. Veeder, the Cayuga blacksmith, was paid £60, with something for sundries. Ryer Booen went to Onondaga with goods, two men and a gunsmith, and was there from November 1747 to May 1748.

Hendrick Herkemer, gunsmith at Onondaga, with two helpers and materials, was paid £70 for services from October 1748 to May 1749. The Seneca blacksmith had the same. It was customary to spend about six months in this service. Others are mentioned but it will suffice to speak of William Printup, blacksmith at Onondaga in 1750. He was a favorite there for some years and his name is still borne at that place.

This matter receives special attention here because it has been customary to speak of the anvils and blacksmith's tools which have been found as French. Few or none of them were. The Onondaga anvil, which Father d'Heu said belonged to the French party, the Onondagas asked permission of the English to retain but a few years before. The latter had furnished it and a smith. In the Seneca country alone did French smiths work, as far as records go, and that but for a short time. It is probable one may have been with the French colony at Onondaga lake in 1756 but there is no clear proof of this.

The Iroquois were not willing their dependents should have equal advantages with them. In 1750 the Shawnees and Nanticokes wished a smith at Wyoming, as well as at Shamokin Pa. and sent their request by Cammerhoff and Zeisberger. The Onondagas positively refused this.

When we consider the great quantities of axes that the English and Dutch both sold and gave to the Iroquois, and the universal prevalence in early years of the form known as the French trade ax, we are led to believe that all were not French, but that this was the common European form two or three centuries ago, as it is in Germany yet. A large proportion, at least, seem to have been made at Utrecht. In any case most of the iron axes found on New York Indian sites passed through the hands of its colonists.

Fig. 8 is much reduced and has one unique feature. While having nearly the common outline, a sharp spike rises from the upper edge, 1¼ inches high, giving a height of 6½ inches to this corroded implement. It was found at Rome N. Y. and may be dated about the middle of the 18th century.

Fig. 99 is a large and typical trade ax from Pompey, unusually wide for its length. It has the frequent three crosses and is very heavy. The figure is much reduced, the implement being 8¼ inches long. This ax is in the Skaneateles library. Fig. 98 is a very large and peculiar ax, also much reduced, the actual length being 10⅜ inches. The lateral edges of the blade are now parallel, but the posterior may have been cut or ground down. The three crosses give weight to this supposition. In its present condition it is unique. It is in the Cazenovia library and was found at Nelson Flats, Madison co. as well as the following two.

Fig. 167 is the reduced form of a typical trade ax, with one unique feature. The two circles each inclose eight lines radiating from the center, instead of the cross. It is 7¼ inches long with a blade nearly 4 inches wide. Fig. 168 is similar but larger, the extreme length being 8¼ inches and the greatest width 4 inches. The three circles on each side each inclose a double cross. Both these show one characteristic feature of these early axes, the angular indentation of the outline below the socket. Quite a number have been found in the town of Nelson.

Fig. 90 is a curious ax in the Bigelow collection, which was found at Jack Reef on the Seneca river. It shows signs of long use, and was evidently once longer, but its most singular feature is a large rectangular perforation through the lower

part. The posterior portion inclosing the socket is like some modern forms. The iron is much corroded.

Fig. 116 is a reduced drawing of an iron ax belonging to the Johnstown historical society, and which was cast or forged in one piece. The slender iron handle was evidently intended to be inserted in one of wood. It is said to have been found 8 feet underground at Johnstown N. Y. and the general form is quite modern. The head is 3⅞ inches from top to bottom and the length through the handle is 9⅜ inches.

Fig. 89 is another of these solid forms, of what may be called a tomahawk pattern. It has a slender projection like the last, for insertion in a wooden handle, and a sharp spike once protruded in front. The upper part terminates in a long and curved point. It is quite thin, and was found at Fort Bull near Rome N. Y. The length was 10 inches and it now measures 8½ inches from the curved tip to the front angle of the cutting edge.

Fig. 102 is from the same place and of actual size. The cutting edge has been a little broken. This tomahawk is much like some of our present hatchets, but less angular. It is rather a frequent form. By degrees tomahawks took more slender, and even graceful shapes. Fig. 97 is a reduced representation of a very common kind. The maker's initials, J. G., are on both sides, and are shown in the drawing. Otherwise the surface is plain. This is owned by Wilson Johnson, on the Onondaga reservation and is 8¼ inches long.

Fig. 101 is a slender tomahawk, as long above the handle as below. The upper part is much curved and sharply pointed. This is in the Bigelow collection and came from Jack Reef on the Seneca river. It is one of the most frequent forms and its extreme length is 8¼ inches.

Fig. 91 is a small iron tomahawk from Union Springs which approaches the pipe tomahawk form. Almost every variety of iron ax is represented there. Fig. 77 is a small iron hatchet from Fort Plain, and is quite unlike most others. It is in the Richmond collection.

Fig. 100 is a fine and slender steel tomahawk, with a pipe-bowl, which belongs to Mr George Slocum of East Onondaga. He had it from an old Indian who said it was used in the war of 1812.

Fig. 92 is from a half size drawing of a pipe tomahawk by Mr R. A. Grider. It is from the Bellinger farm, near Middleburg, Schoharie co. The handle is hollow and on it are 19 groups of three lines each which Mr Grider thought represented 19 scalps. They are quite as likely to have been purely ornamental.

Fig. 93 is a pipe tomahawk of unusual form, the handle of which is handsomely inlaid. The total length is $12\frac{3}{4}$ inches and the part represented is of actual size. It is said to have been given by an Indian woman to Mrs Thomas Dixon of Jamesville N. Y. about 1800.

Fig. 94 is a pewter tomahawk pipe found on Edward Black's farm, east of Onondaga lake and south of Liverpool N. Y. It has many moldings, and is slightly ornamented with dots. This would do very well for smoking and might have some slight value in war.

Fig. 95 is another tomahawk pipe from Stone Arabia, of the same material and neatly made. This is in the Richmond collection.

Fig. 88 is in the same cabinet, and came from Canada, but is no finer than many in New York. It is a brass pipe tomahawk, edged with steel and handsomely ornamented. Pipes of the same character may still be seen on the New York reservations, and many historical societies have good examples.

Fig. 96 is not so common and is much reduced here. It is a tomahawk pipe belonging to Cornelius Johnson of the Onondaga reservation. From the top of the bowl to the extreme point directly below is $10\frac{1}{2}$ inches. Below the handle it has the form of a double-edged dagger, widest in the middle. The handle is adorned with brass nails and is finished with a brass knob in front.

Fig. 179 is a curious steel tomahawk in Mr William Lounsberry's collection at Tioga Center, but found on the north side

of the river. The peculiarity is in a sharp projection at the top and toward the handle. About Owego and along the Susquehanna above that point, iron axes and tomahawks frequently occur. Mr A. F. Barrott has one from Owego of the general trade form, but angular above instead of rounded, which is probably of a later type. Dr A. D. Gould has a pipe tomahawk from Willow Point, and others have been found.

Among the many tomahawks to be seen at Owego and vicinity is one belonging to Mr T. B. Reddish, which came from Middleburg, Schoharie co., where there were Indian forts and villages in the 18th century. This has a broad cutting edge, the implement being narrow at the socket and terminating in the long curved point above. On the expanded surface of the socket are the figures 1711. It is the only one reported with a date, except one from Pompey, dated in 1715.

Another Owego ax resembles the trade form, but has a neat scroll pattern indented in the sides. It is probably more recent than the form would indicate, though many pipe tomahawks do little more than add the pipe to this early form. In some of these, at least, the pipe bowl is formed separately and fixed by a screw.

Knives

It is surprising to see what delicate and beautiful work our aborigines did with their simple implements of bone and stone, but they were not slow to see the advantages of metallic tools and gave an appropriate name to their makers. A simple steel knife had a value to them of which we can faintly conceive. Fancy a white boy in the country without a knife! What wonderful things captives have been able to accomplish with one. It is almost the foundation of all civilized skill.

One early practice is commonly associated in our minds with the knife in the savage life of this land. It is that of scalping the dead. Fairly understood it has a different character from what many suppose, being the simple attestation or record of the warrior's prowess. It was not cruel, for no man intended to scalp the living. It was not intended as a savage mutilation, but to

secure proof of what had been actually done. It silenced the mere braggart, who had no scalps to show. Hideous as they seem to us, these were to the Indian what stars, crosses, and honorable medals are to the European soldier. Granting its savage features it was the plainest record in a savage state.

The white man changed this. The honorable distinction became a source of gain. A price was placed on scalps, and men and women were killed for money. Fame and distinction became of less value than mercenary returns, for the white man paid for scalps and beaver skins as kindred commodities. Of this the red man had not before thought.

The French paid scarcely $6 for men's scalps, but King Louis thought they must economize in this. In 1694 he wrote to Frontenac and Champigny, then in Canada, that "His Majesty desires that they conform themselves to the order he gave them last year, to cease paying the Christian Indians 10 silver écus for every Indian killed, 20 écus for each prisoner, and half these sums for women; this will be a further diminution of the estimate. This expense can not be afforded."—*O'Callaghan*, 9:573

The New York colonists acted independently and more liberally or else the general price had advanced in half a century. Under date of May 7, 1747, Col. Johnson wrote to Gov. Clinton: "We shall soon have abundance of prisoners and scalps, wherefore will require a great deal of money, which they expect will be ready here at their return. I have paid the first who came home £60 for the six scalps brought from Crown Point which I could not avoid, and when the rest come in I must do the same, for they look to none else for it & must have it, as they say, punctually paid according to promise."—*O'Callaghan*, 6:361

Many quotations might be made illustrating this subject. Whether bounties were paid by either side during the revolutionary war does not clearly appear, though it is probable. The noted account of scalps taken by the Senecas, published in 1782, was long believed but is now known to have been written by Dr Franklin for political purposes. It has yet a certain value as being a good description of how scalps were stretched, dried and painted.

One of the great medicines of the Iroquois is connected with a traditional scalping incident and a great Huron feast was founded on the same story. The owl and the wolf meet, and the coming of the Ontarraoura is predicted. This animal seems to be the panther, or mountain lion, and to him the resuscitation of the good hunter is ascribed. In the New York story the good hunter loses his life and scalp. After many trials a bird brings the scalp back, but it is so dry it will not fit. At last the eagle suggests softening it with the mountain dew which has collected between its shoulders. The scalp becomes pliable, is fitted to its place, and the good hunter lives again, to the great joy of bird and beast. In this the presence or absence of the scalp becomes synonymous with life and death.—*Beauchamp*

In general there is nothing to distinguish the scalping from the hunting knife, but nearly all are pointed. Some were supplied ready for use; in other cases the handling seems to have been left to the sons of the forest. They were sold or given as presents by Dutch, English and French, and were of many forms and sizes. Illustrations will be given of a few of these but from their thinness most have perished.

The Dutch so soon began a spirited Indian trade that the French could do little in New York, except among the Senecas. Knives were among the smaller articles which La Salle wanted at Fort Frontenac in 1684, but in 1708 M. de Longueuil reported that Schuyler had given the Iroquois 800 knives. At the siege of Detroit in 1712 the French Indians were given 190 butcher knives, to be used as bayonets. These may have been the long carving knives here shown.

Among the presents to the Iroquois at Albany July 3, 1693, were 87 hatchets and four gross of knives; and among those recommended the next year were "2. Grose of Knives black hafted sharpe points." They were an ordinary article of trade besides. Hence we may conclude that most of those found in New York were of Dutch or English make. During the period of the French missions here, French articles were quite freely used, but before and after the supply was small. This is not

quite in accordance with prevalent opinion, but the proof is clear. West of Onondaga the French for awhile had a better chance. The question is one of interest but can be treated better in speaking of ornaments.

Fig. 106 was found in the town of Venice N. Y. in September 1887. It has a well preserved bone handle of European make and the total length is 8½ inches. All the illustrations on this plate are reduced. Fig. 107 is quite like the last, but the bone handle is differently ornamented. It is in fine condition and was found at Scipioville in 1886. It is a trifle longer than the last, the point having been less ground. Fig. 109 is from Fleming in the same county and has a horn handle, possibly of Indian make. The form differs from the last two, and it saw more use. The full length is 9 inches.

Fig. 110 is an iron knife in the Vail collection, found in the fort south of Pompey Center, with several others. This is a relic of the early Dutch trade, no distinctly French articles being found on this site. The handle is gone but the usual tang for hafting remains. The full length is 6¾ inches. Fig. 112 is from the same place, differing only in length, which is 9 inches.

Fig. 122 is a much corroded knife from Pompey, belonging to the writer. It is wider than usual. Fig. 105 was found at East Cayuga in 1888 and is more suggestive of a typical scalping knife than most others. The rude handle is of horn, probably made by the Indian owner. Fig. 118 is much reduced. This knife is said to have been used in war, and was given to Albert Cusick by another old Onondaga Indian. The blade is sharp, slender and curved, and the wooden handle well preserved. The full length is 15 inches.

Fig. 114 is almost unique, but there is another smaller one like it from an adjoining site. Both are from Fleming and were found in 1887. In this one but a small part of the iron blade remains. The handle is of brass and shows two Flemish lovers in an affectionate attitude.

Two very remarkable French knives are drawn from photographs furnished by Mr W. W. Henderson of Jamestown N. Y. In the illustrations they are much reduced from the full size. Under date of July 1, 1887, Mr Henderson wrote:

The knives were found in gravel, below the base of an artificial mound erected on a high ridge, through which a roadway had been cut, removing half the mound, and leaving the roadbed 10 feet below the base of mound, as first discovered by early settlers. In excavating for the roadway the knives and bones no doubt slid down from a point above in the body of the mound. The apex of the mound is at present 15 feet or more above the roadbed. It is thought De Celeron with his large company of French and Indians camped near this spot in 1749, and long previous to this date the natives of this locality no doubt had intercourse and traffic with the French in Canada. . . The above mentioned mound is near Jamestown and the knives were taken from it April 1887. They bear the words "Lempier—Rue St Honore—34. ☞ a Paris."

In a letter dated May 10, 1901, Mr Henderson corrected this statement:

Two steel French knives, 12 inches in length of blade, one 2 inches in width at the handle and the other 1½ inches, bearing the trademark "Sabatier, Rue St Honore, 84, A Paris," were found with a human skeleton in removing a large mound from highway near Fluvanna. They were doubtless obtained by the Senecas from the French in Canada by traffic or stealth, or were intrusively buried in this mound with some deceased French hunter.

Fig. 169 shows the narrowest of these knives, the trademark being on the opposite side. It is 1½ inches wide at the handle and 12 inches in length thence to the point. Fig. 170 is 2 inches wide at the handle with a blade 11 inches long. They are like the common carving knife and suggest the butcher knives to be used as bayonets.

Fig. 72 is a large, flat and angular knife, made from a brass kettle, and found near Beaver lake, Lysander. Grooves and notches have been filed near the base, for secure attachment to the handle. Iron knives were so abundant that a makeshift like this is rare.

Fig. 178 is a remarkable recent copper knife of moderate thickness, found by Mr Luke Fitch on Indian hill, Pompey. The form is that of a shoemaker's knife, and it has a tang for insertion. Iron knives are frequent there but this is the only copper one the writer has seen.

Miscellaneous

Prefatory to an account of a few miscellaneous metallic objects found on Indian sites, it may be well to mention some of those of all kinds on which duties were imposed in New York in 1686, and which were intended for Indian trade. Most of these have the word "Indian" prefixed.

They were Indian duffels, strouds, blankets, plain cottons, half thicks, white Olembriggs, kettles, hatchets, hoes, red lead, vermilion, cotton, red kerseys, knives, shirts, shot, woolen stockings, Indian haberdashery, drawing knives, looking-glasses, wooden combs, beads, tobacco in roll, belts, scissors, jew's-harps, Indian paints, drills, tobacco boxes, Tinsie lace, gimp lace, needles, tobacco tongs, powder horns, Indian heales (steels). In the law of 1692 white osend cloth takes the place of white Olembriggs, and in that of 1699 it reads white Ozenbrugs Mellish. Both have bells instead of belts, and this is probably correct. Guns with all their parts afterward appeared among treaty presents, adzes, shears and toys, powder and ball, bars of lead, gun flints, shoes with and without buckles, hats, fans, articles of shell, laced coats and hats, red coats, jackknives, garters, tomahawks in 1714, silver medals, added to a large trade in ornaments of silver and brass.

Peter Stuyvesant wrote to the duke of York on behalf of the Dutch inhabitants, in 1667, in regard to this trade:

Since the Trade of Beaver, (the most desirable comodity for Europe) hath allwayes been purchased from the Indyans, by the Comodities brought from Holland as Camper, Duffles, Hatchetts, and other Iron worke made at Utrick &c much esteemed of by the Natives, It is to be fear'd that if those Comodities should fail them, the very Trade itself would fall, and that the ffrench of Canida, who are now incroach'd to be too neare Neighbours unto us (as but halfe a days journey from the Mohawkes) making use of their Necessities and supplying them, they will in time totally divert the Beaver Trade, and then the miserable consequences that will ensue, wee shall not have one shipp from Europe to trade with us.—*O'Callaghan*, 3:164

On this general question of use and supply the liberty is taken of quoting part of a letter from Mr S. L. Frey on recent articles

found in the Mohawk valley. Some of it may be irrelevant, but no more appropriate place may be found for it:

In the modern sites there is found a great variety of traders' iron and copper work. I have some; principally iron axes, hoes, padlocks, jew's harps, thimbles, knives—some made from files, cold chisels, steels, etc. Copper kettles are found in graves, as well as ornaments of copper. I have but a few. Venetian beads are in great variety. Nails, buckles, and horse shoes are found; also hinges, gun locks and barrels. Every digger has some novelty. Most of the iron axes found here, marked with one, two and three crosses, were made at Utrecht for the Indian trade. The white clay pipes marked R. T., E. B., and others, are English, while some others are Dutch. They were given to the Indians by thousands. Grès de Flanders ware was brought in small quantities by the traders. I have one jug from a grave, and I know of one other with the arms of the city of Amsterdam on it. There is a curious white earthen vessel in the Richmond collection, from a grave, and I have heard of a few other pieces of earthenware. Bottles are singularly scarce. I know of one "apostle spoon." I never heard of a single steel trap being found. English gun flints are not uncommon. A rum bottle with W. J. impressed (said by the finder to mean William Johnson) came from the site of the Jogues shrine.

The writer again calls attention to the fact that the so called French axes were most of them made in the Netherlands. It is quite the fashion in the interior of New York to call any early European remains French and there are several nominal French forts where none ever stood. Articles of a religious character mostly came from that nation.

Steel traps were commonly used at a distance from the towns and were not likely to be lost at home. The writer has found but one small one on an Indian site. This may be recent, but seems antique. Bottles are rare and may have been little used. The Indian did not drink while hunting, but emptied the keg at village feasts. Cups were used then, and several silver ones have been found.

The above summary does not include everything furnished in the Indian trade, but no one who reads it will be surprised to find any article of the period on any Indian site later than the middle of the 17th century. It was a simple question of

use, taste and ready supply. No durable article mentioned above has failed to appear in one place or another while the list might be much extended. The Indians used compasses for laying out geometric figures, and the writer has seen a hammer stone, with circles and an inscribed star, which was found in an Indian fireplace. Thimbles, locks and keys, bars of lead, buckles, sword hilts, large and small vises, pewter platters, spikes, trammel hooks, handsaws, anvils, cannon balls, horse-shoes, hammers, files, hoes, steels for striking fire, are among the articles found. Mr J. V. H. Clark says of the northern part of Pompey: "Wagon loads of old iron have been taken from these grounds."

Fig. 108 is a fine and curious steel chisel from Pompey which was in the Ledyard collection. The edge is good and there are two long and deep grooves above this, one above the other, reaching about half way of the long and slender implement. The edges are chamfered near the base.

Fig. 76 may be called an iron chisel. It is quite broad for its length, which is 4½ inches including the broad tang. It was found in Fleming in 1887 and is much corroded.

Fig. 126 is a quadrangular steel celt, found on lot 53, south-east of Pompey Center. All other remains known to the writer there are prehistoric, but the fort of 1640 is about a mile west of where this was found. It is a fine and unusual article.

Fig. 124 is an iron awl from the fort just mentioned. It is corroded, but sharp and somewhat curved. Fig. 125, from the same place, is much like the last, but smaller. Some of the old Onondagas yet have similar ones in bone handles. Fig. 154 is from the same place, and is of the same general character. They are frequent there.

Fig. 81 is in the Hildburgh collection and came from Ontario county. It is long, flat and sharp, and might be called an awl, but Mr Hildburgh considers it a brass arrow or spear head. In either case it is an unusual form.

Fig. 161 is a slender, flat and curved copper awl from Indian hill, Pompey, where many have been found. It has the appearance of being cast.

Fig. 123 is an iron spike found by Seneca river, in Lysander. It is cylindric, long and slender, with a narrow base, and is not a rare form.

Fig. 64 is a long iron spear, greatly reduced in the illustration, the full length being 8½ inches. This was found in the town of Oakfield, and belongs to C. F. Moseley, of Bergen N. Y. The triangular base has a triangular perforation, and the other end forms a spearhead, occupying two fifths of the entire length.

Fig. 119 is a spearhead at the end of a very long shank. It is of iron and was found 2 miles west of Canajoharie. Fig. 121 has the same general form but the shank is but about half the length of the last. This was found at Indian Castle north of Watervale. The form is frequent and widespread.

Fig. 115 is an iron spearhead, much like a double bladed knife or dagger. It is leaf-shaped and has a tang. This is from the fort south of Pompey Center, where several have been found. It seems much rarer elsewhere. Fig. 120 is much like the last, but the blade is less than half the entire length. It was found in 1885 at Cross lake.

Fig. 185 is a cylindric piece of copper, hammered down to a broad edge at one end. This is from Indian hill, Pompey.

Fig. 69 is an old steel for striking fire with flint and tinder, which belongs to William Isaacs of the Onondaga reservation. This was the national emblem of the Mohawks and rude drawings of it may sometimes be seen attached to old treaties. The Mohawks probably got the flint and steel soon after coming to New York, if not while still in Canada. Their own name referred to this as far back as it can be traced, and they came in contact with the whites first of all the Iroquois. The early Norsemen used the same form of steel. Many forms occur.

Fragments of brass kettles were utilized for tools and ornaments. Fig. 18 shows such a fragment notched for a saw. Fig. 135 is a much larger piece, one edge of which is merely regularly cleft with a knife for the same purpose. It was found by the writer on the recent site near Wagner's hollow, in Montgomery county.

Fig. 165 is a slender copper fishhook from the recent site known as Upper Cayuga, on lot 114, Ledyard. There were many of these there and at Scipioville. Fig. 166 is a large iron fishhook from Scipioville, where several were found. This one has the line still wound around the shank, where it was preserved by iron rust.

Fig. 162 is a pewter mug from a grave at East Cayuga site, lot 95, Fleming. In the mug were 44 French coins, dated from 1642 to 1656, and mostly having two holes for suspension. All were of copper, about the size of our half cents but thinner. This mug was found by and still belongs to Mr John Perkins.

Fig. 15 is a bullet as it came from the mold, found at Indian Castle, north of Watervale. Musket balls often occur in good condition, ready for use but unfinished. The writer has figured bullet molds from the same place.

Two immense iron hoes were found at Fort Bull near Rome N. Y. One of them was $7\frac{3}{4}$ inches broad by 7 inches deep with an ample socket for the wooden handle. On the Cattaraugus reservation may still be seen similar great hoes which the Senecas say were presents from Washington.

Tobacco boxes were commonly changed into paint boxes and receptacles for ornaments. One of these, filled with trinkets, was found in a grave $2\frac{1}{2}$ miles west of Fort Plain. They often occur in graves, placed there when it was the fashion to inter articles with the dead. This one was nearly 3 inches across.

Mr W. W. Adams took out of one Cayuga grave the following articles, May 2, 1888: One brass kettle, 17 flints, two gunflints, six bullets, six long shell beads, a bone harpoon, three buckhorn handles, a knife with buckhorn handle, 21 gaming flints, three bars of lead, five rubbing stones, 16 bears tusks, two axes, two pairs of shears, four pairs of bullet molds, two gunlocks with flints, 47 pieces of gunlocks, 32 knives and cutting implements, two large iron shears, a gun 4 feet 8 inches long, a pipe, a piece of black paint, a piece of mica, two trigger guards, one wormer, a gun cleaner, steel and two flints, a quantity of

powder in a cloth bag, two melting ladles and 2500 wampum beads. There were also some Jesuit bronze rings.

Though this is a great quantity from one grave, attesting the dignity or wealth of the inmate, some others probably exceeded this in value when silver ornaments lavishly adorned the dead. Nothing was too good if they were really loved. The above list is curious in showing the contemporaneous use of many things.

In describing the foregoing articles the writer has not forgotten that only those of native copper can be strictly called aboriginal, but the later ones illustrated or mentioned were used by men still in their savage state, and in their own wild way. They were features of Indian life here for two centuries, and to understand that life we must know something of what was in daily use. It has been deemed sufficient to merely mention many things. Guns and all that appertain to them have been omitted. Jew's-harps needed no illustration, unless of a plumed and painted warrior playing on one. Thus many things are omitted in the figures given as being well known in a general way, while prominence has been given to others of prehistoric age. Nearly half the figures are of native copper articles and references are made to very many more. By far the larger part of these have been found east of Cayuga lake, and north of the southern watershed of the Mohawk valley. West of the Genesee river and in the southeast part of the state few have been reported. This may be the result of several causes now left without discussion.

The subject of metallic ornaments is left for another paper, though incidental reference has been made to them in this. They were very few in this state in prehistoric times, for readier and more showy materials were found. Copper implements were more in demand, for their toughness and durability recommended them, even when stone could be more easily wrought. They reveal trade and travel, and a skill of no mean order in working with primitive tools.

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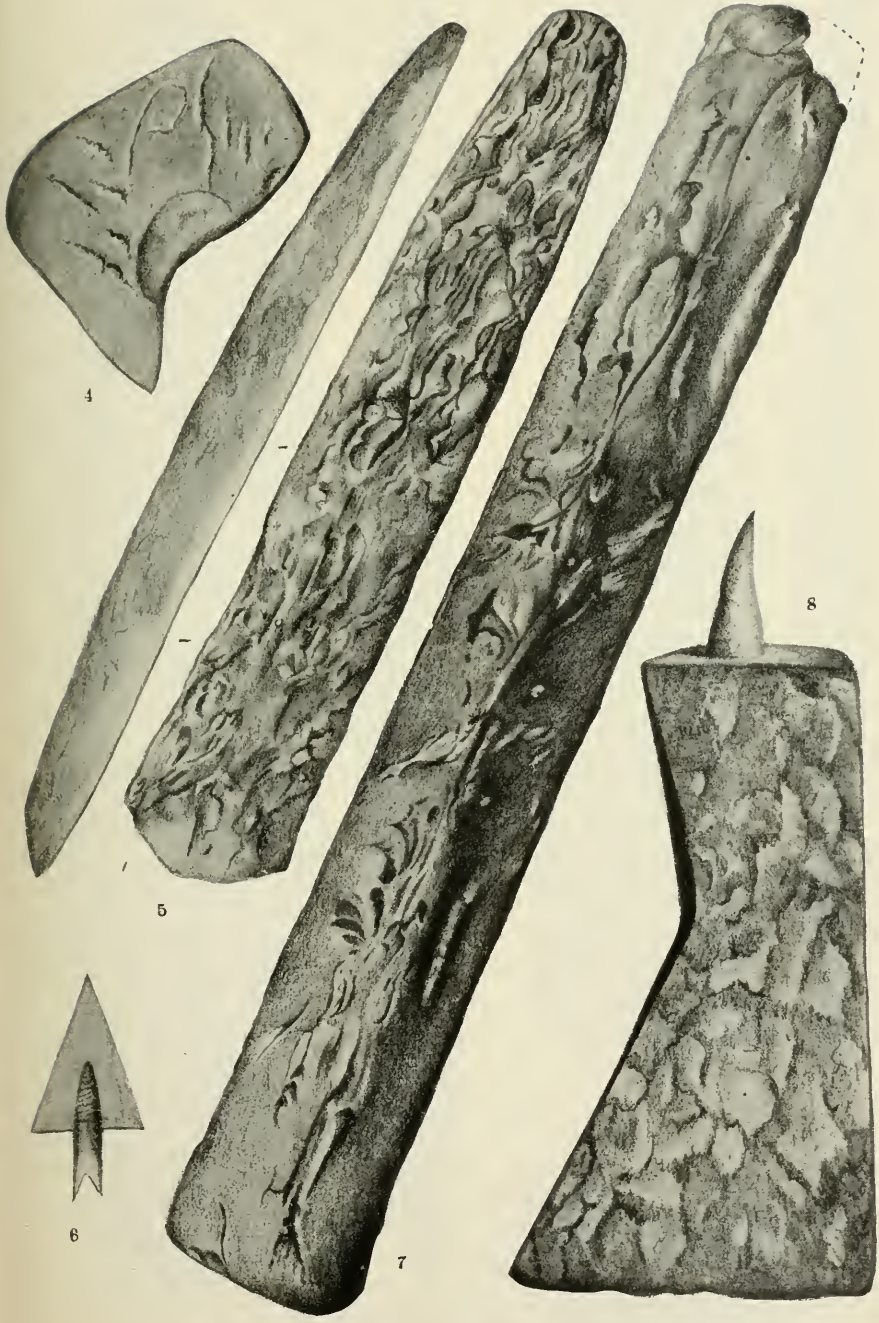
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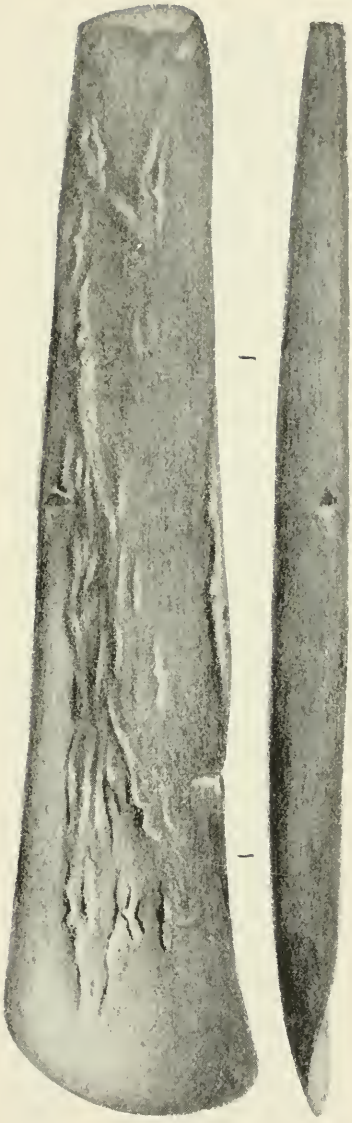

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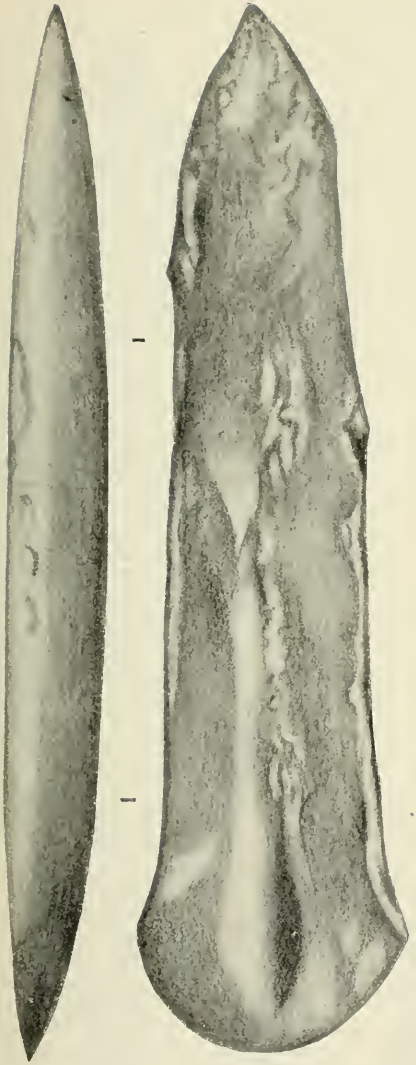

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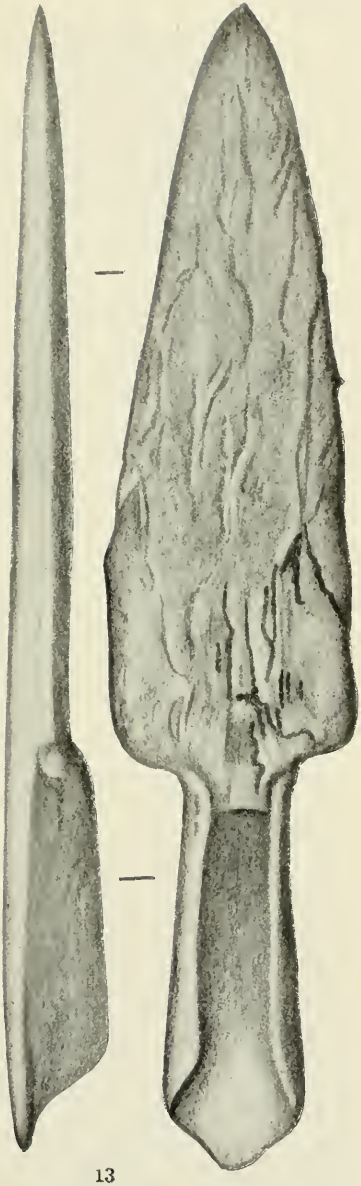

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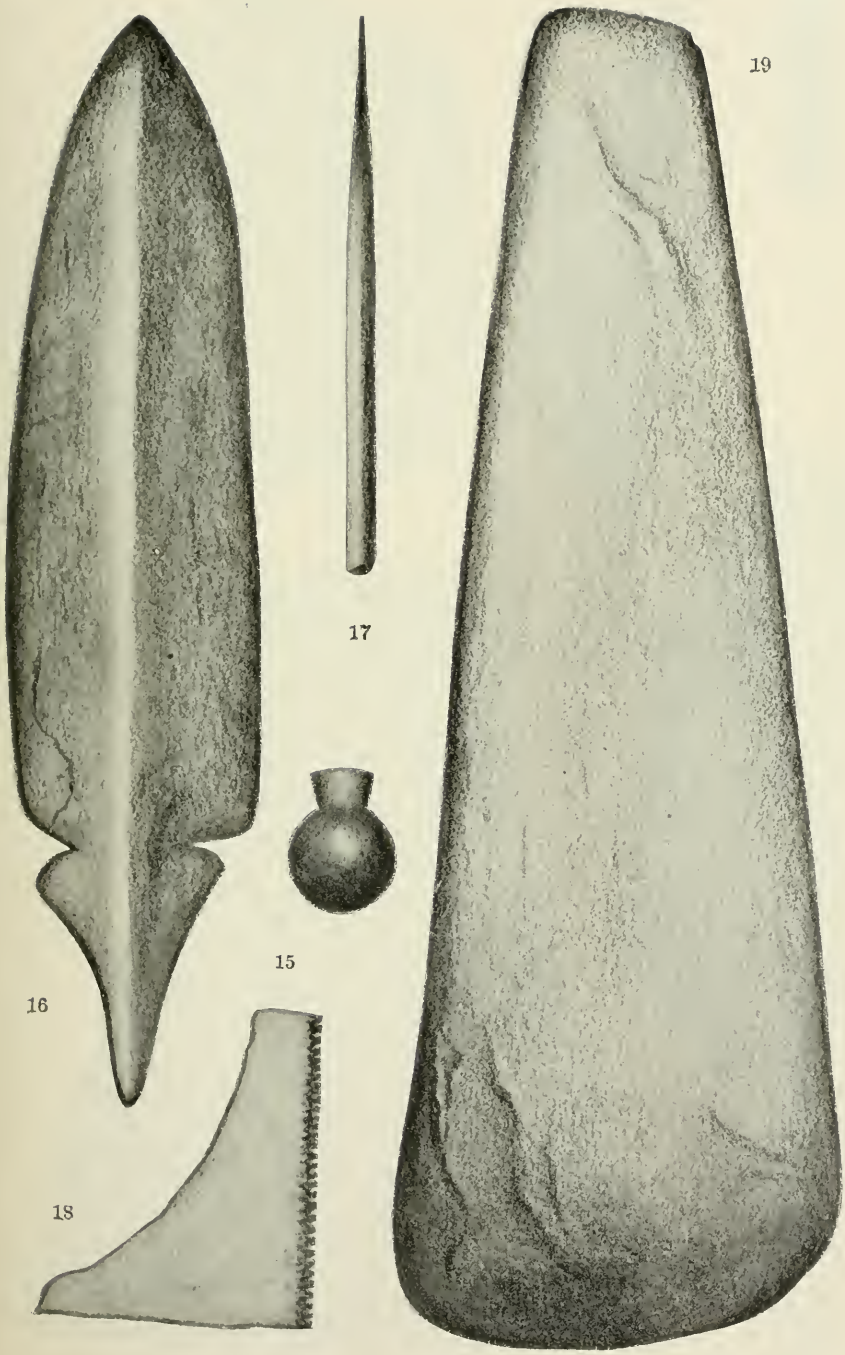
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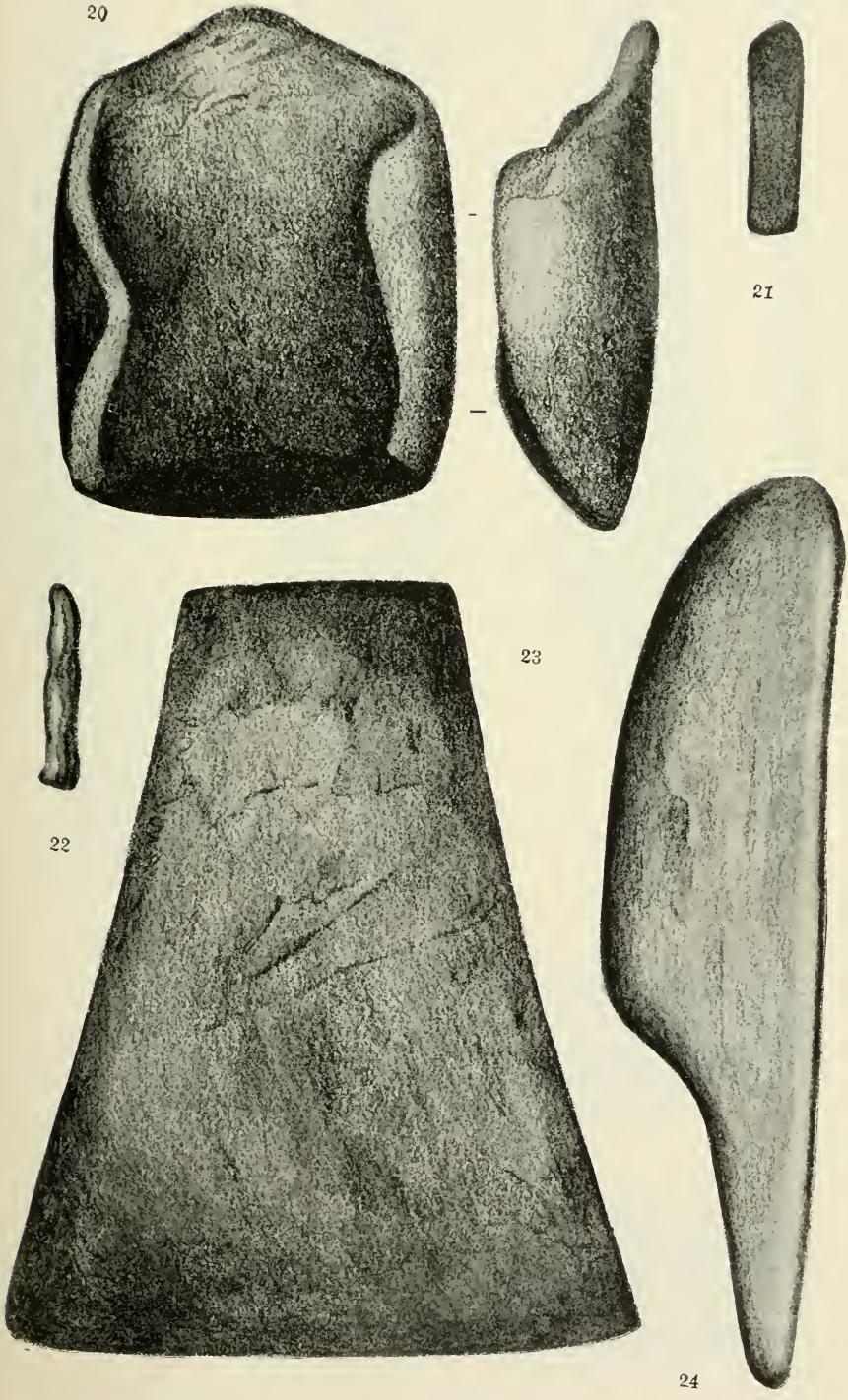
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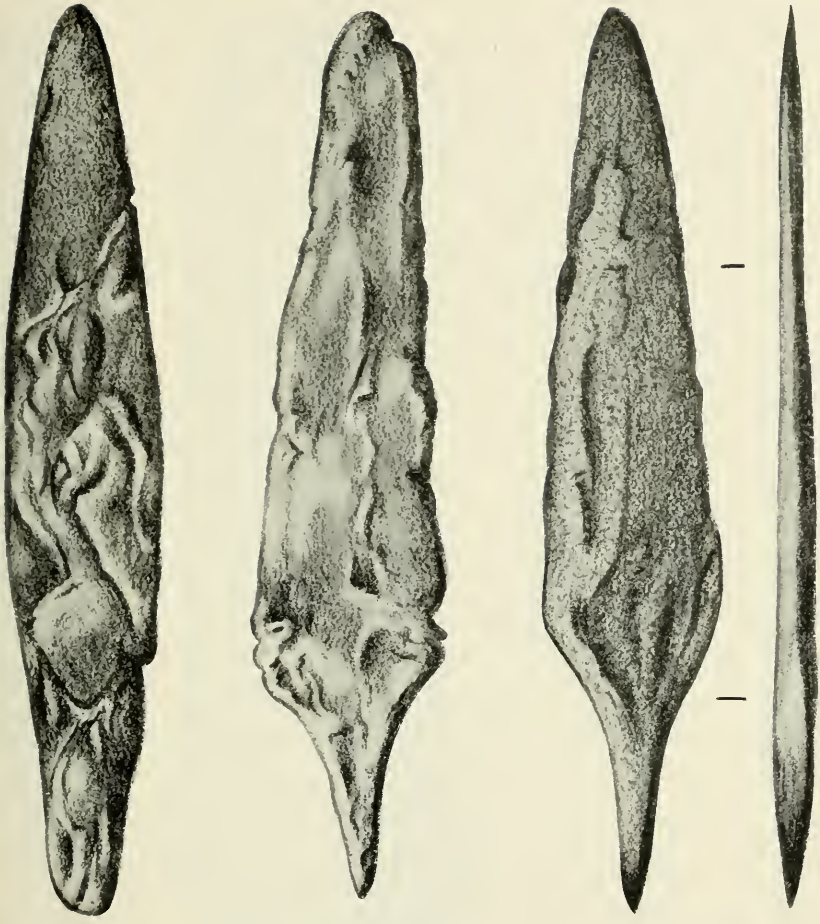

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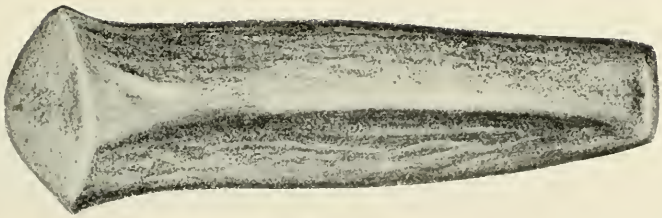

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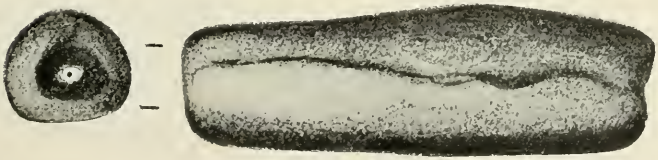

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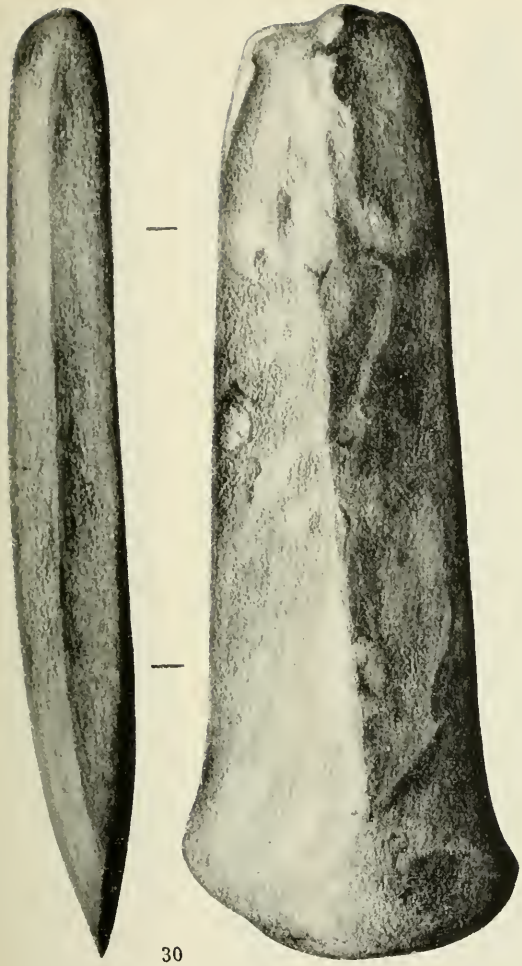

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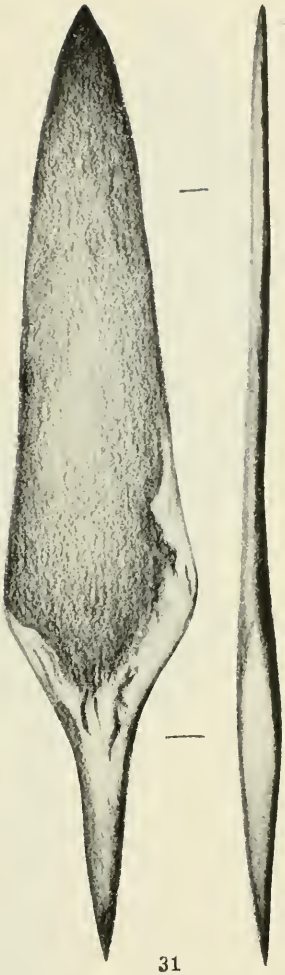

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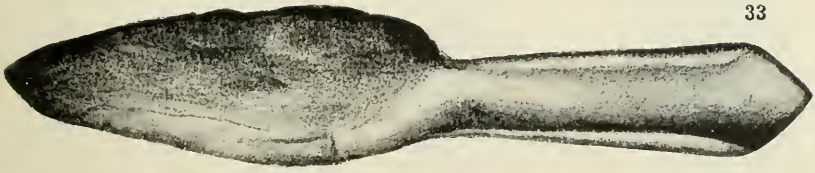

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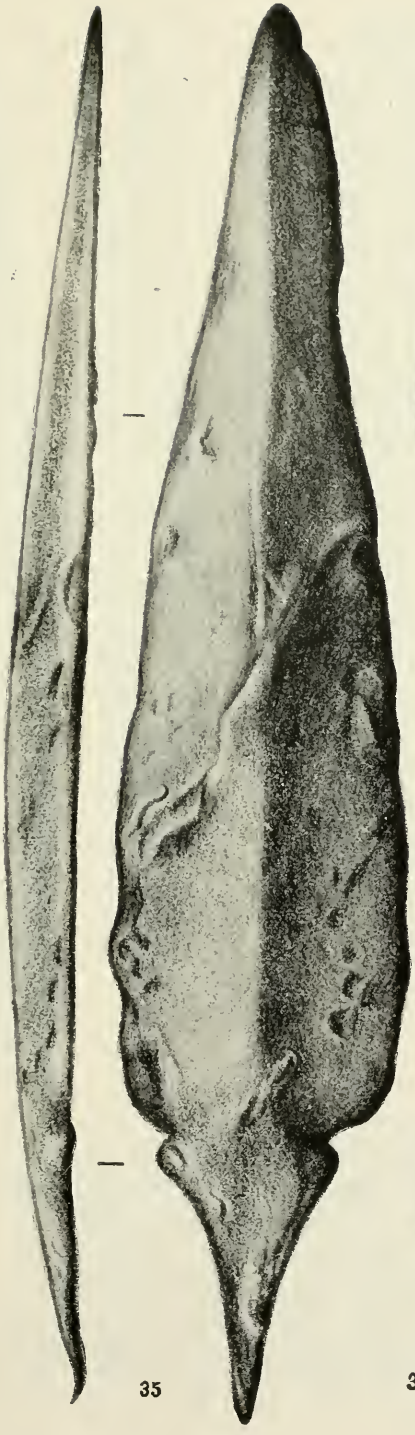

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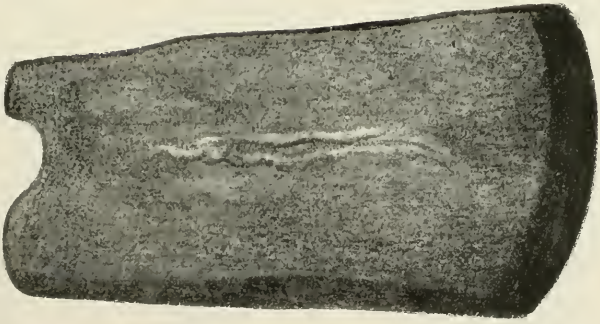

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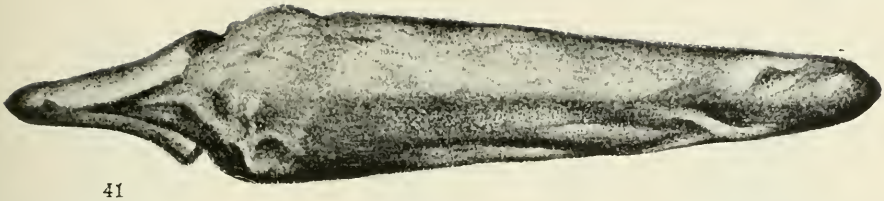

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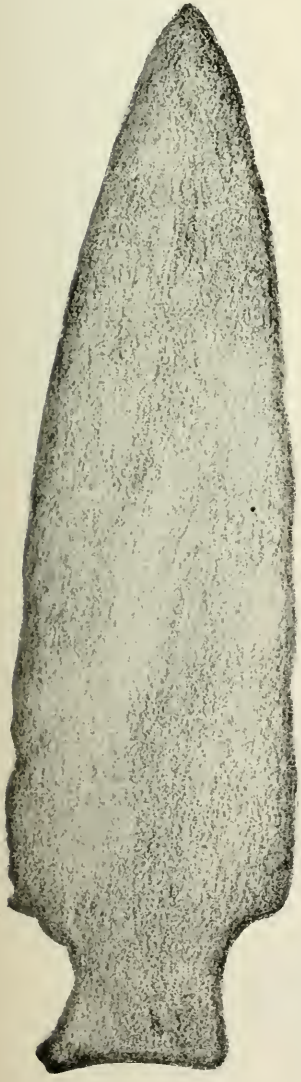

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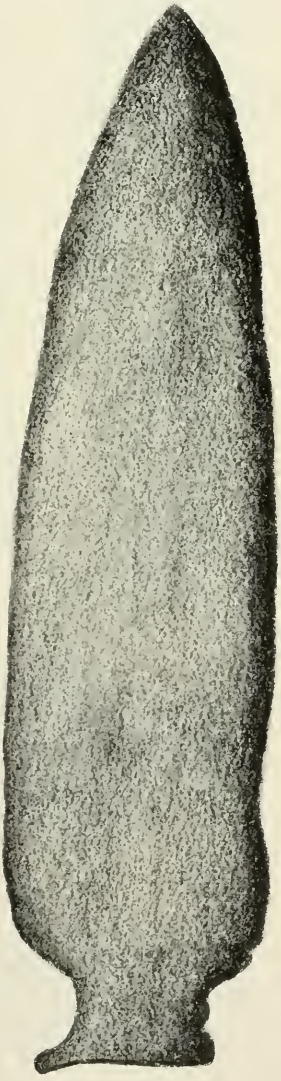

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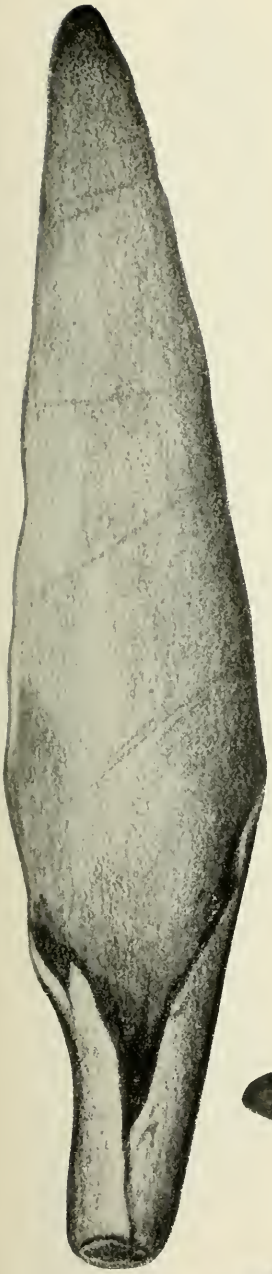

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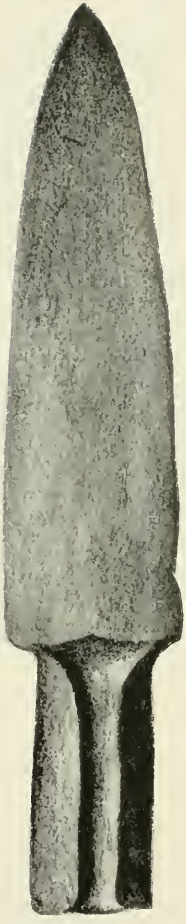

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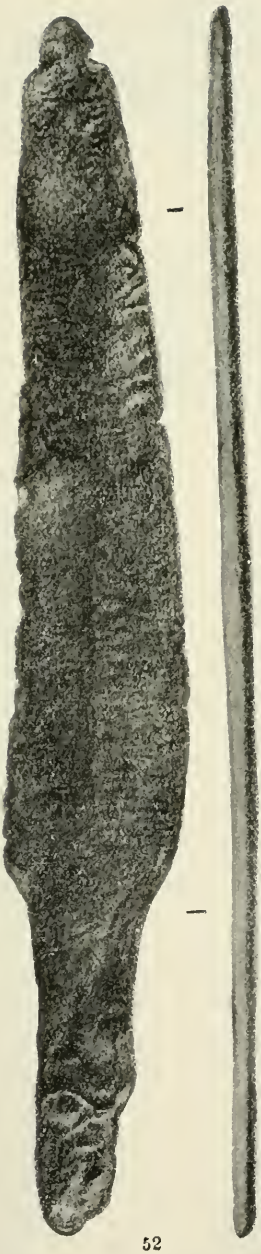

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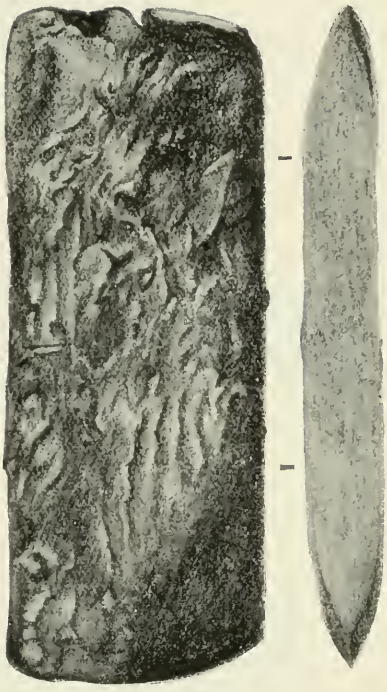

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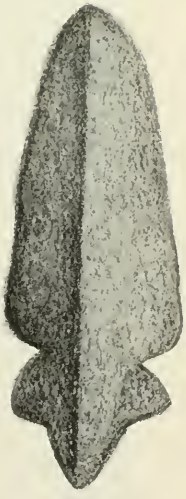

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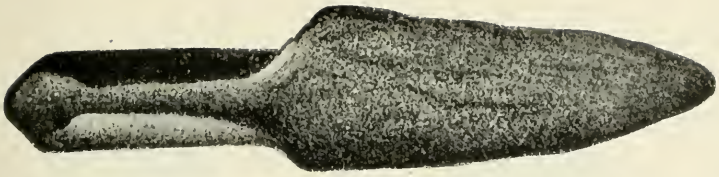

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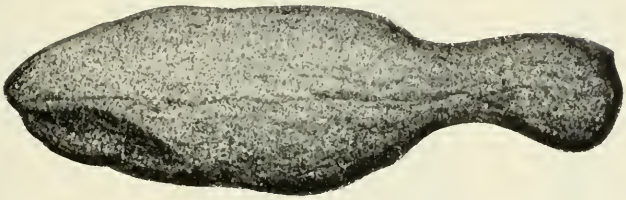

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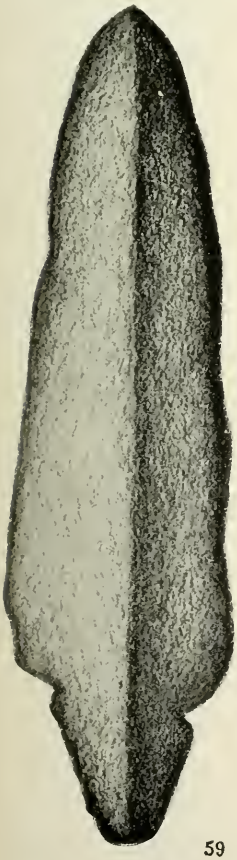

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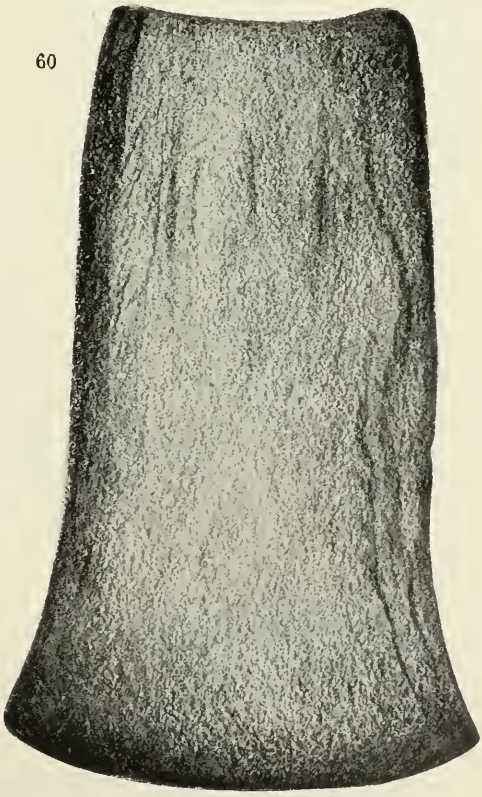

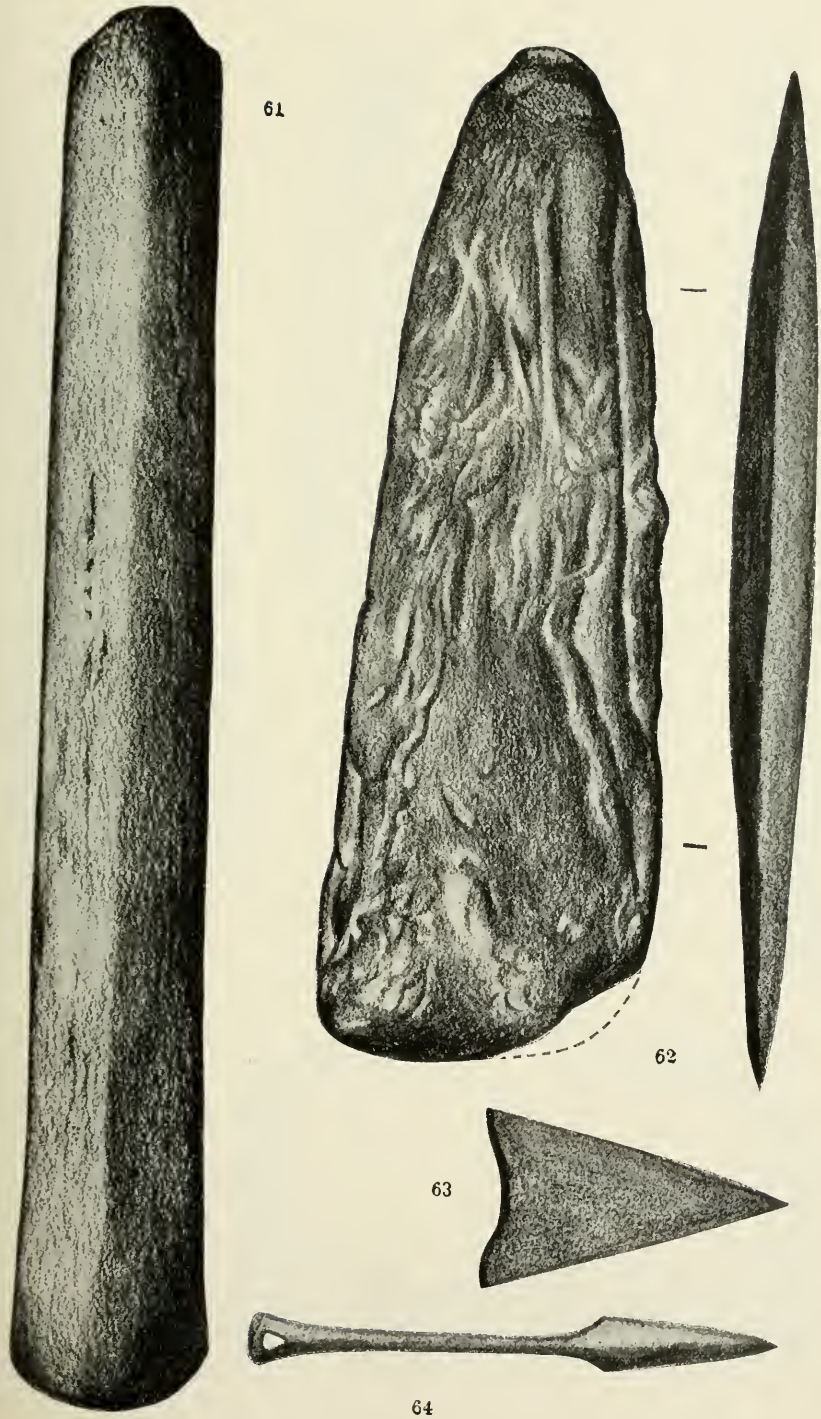

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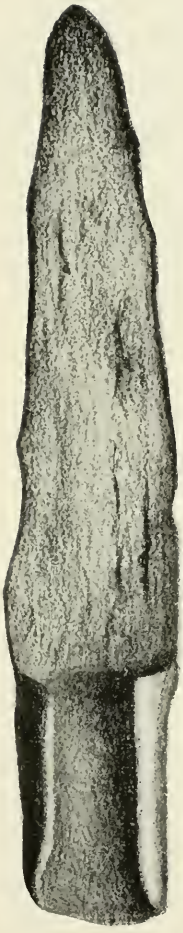

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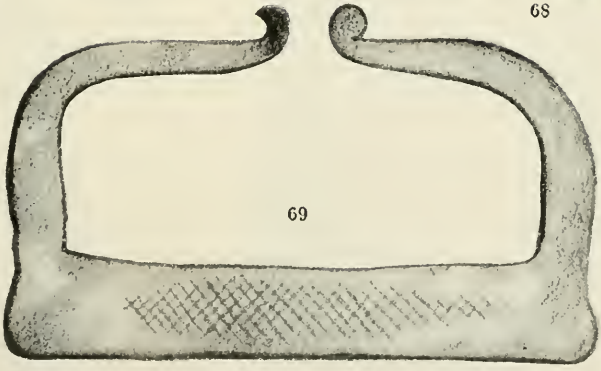

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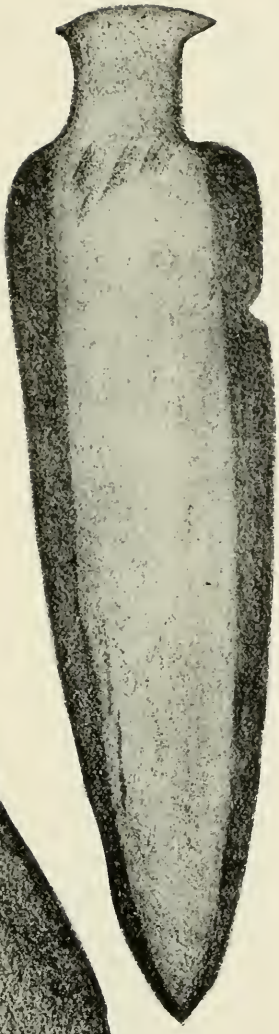

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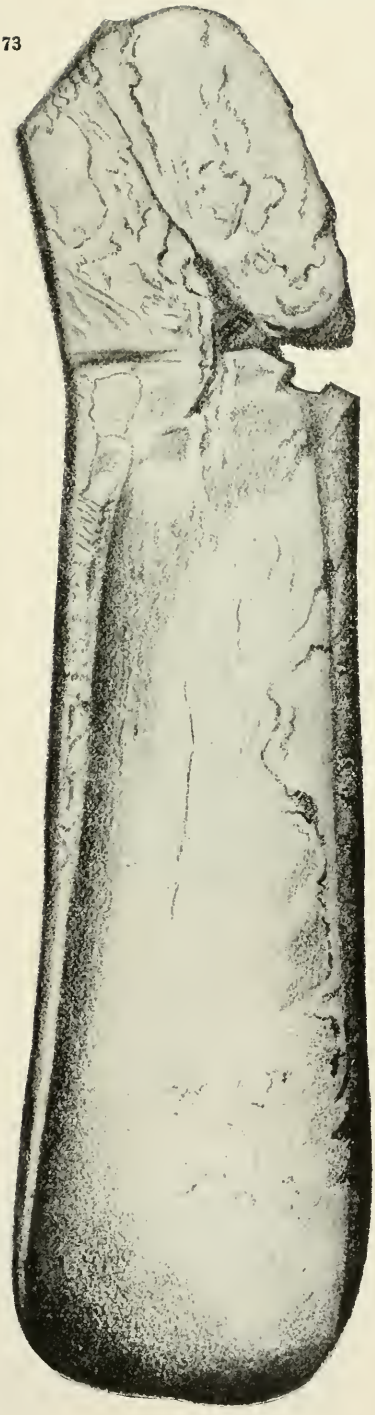

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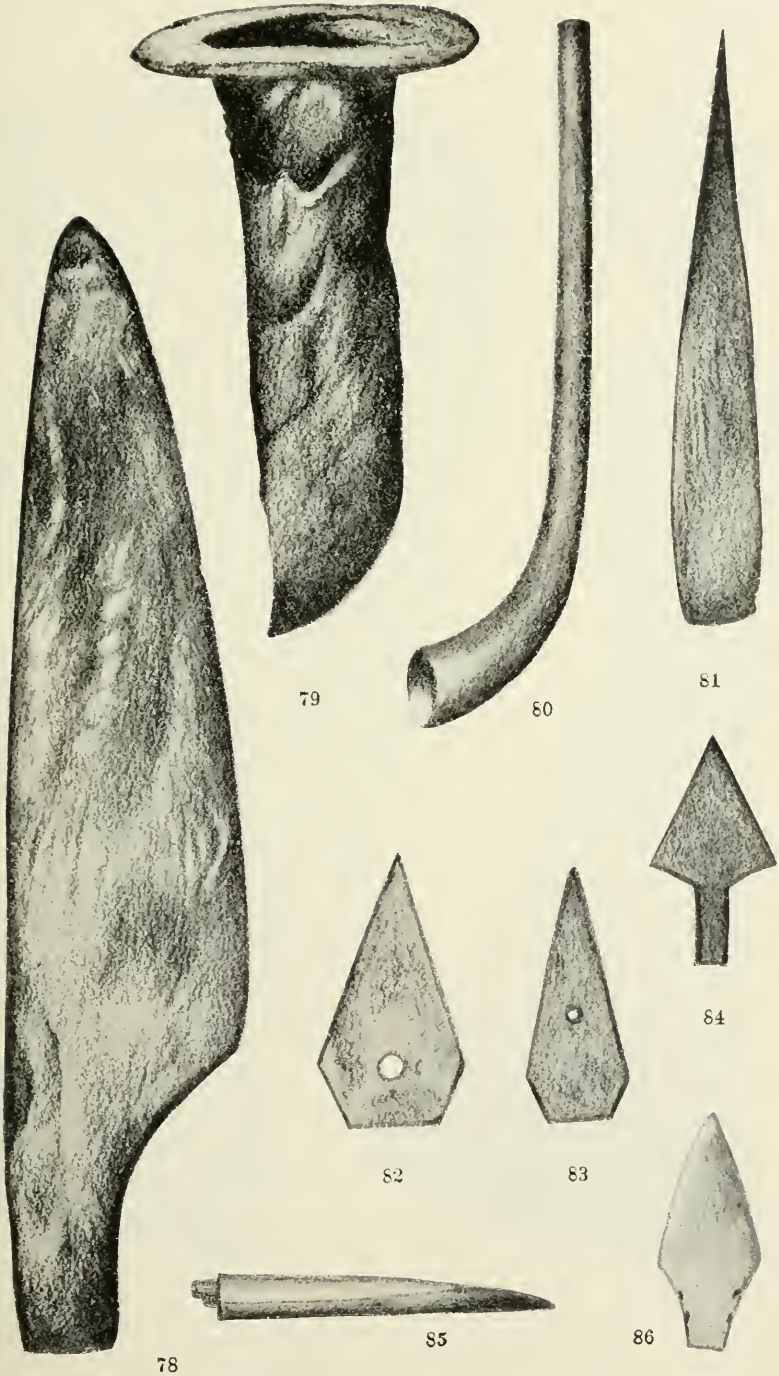
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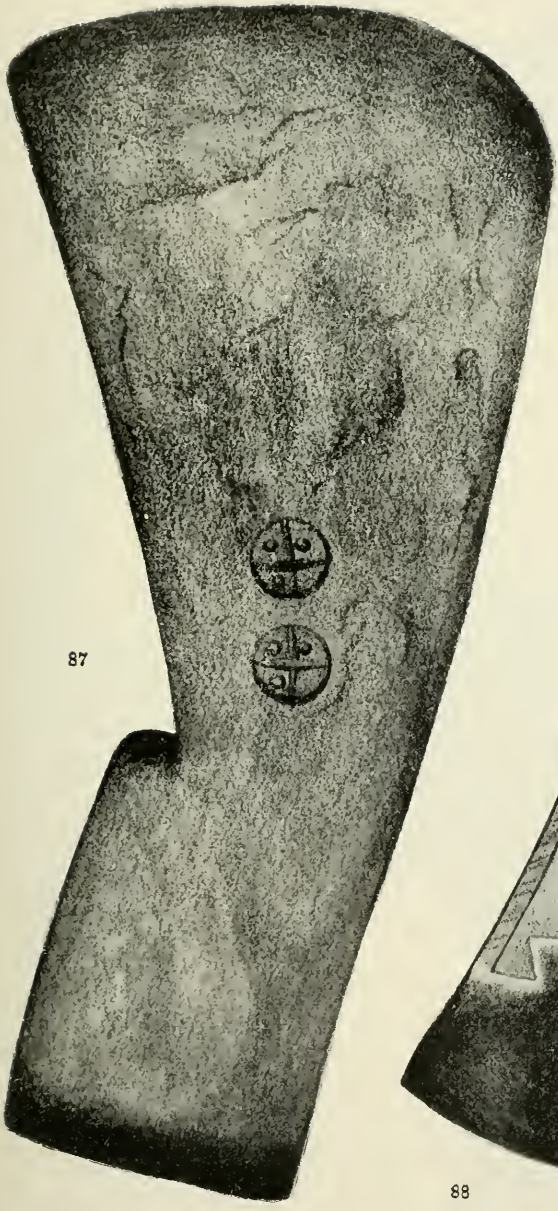

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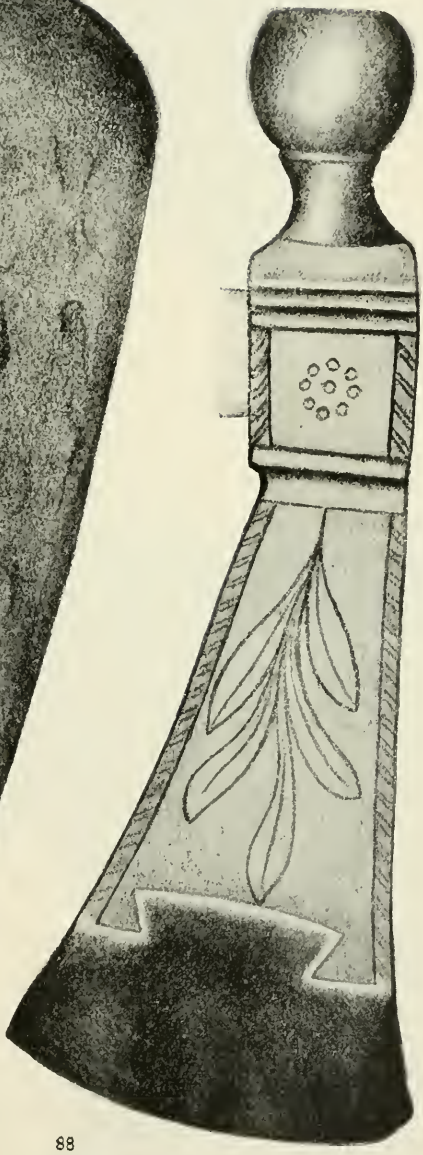

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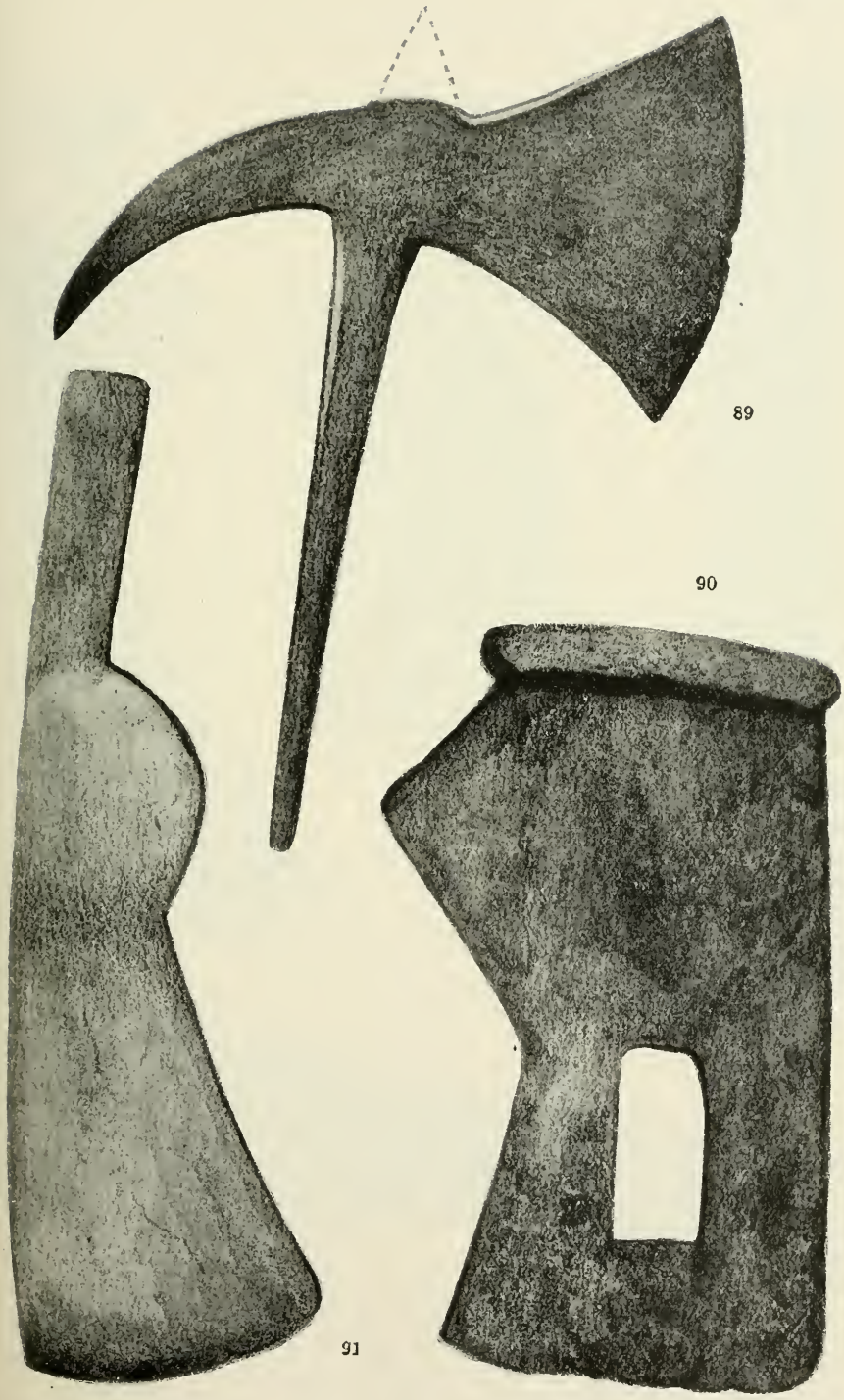

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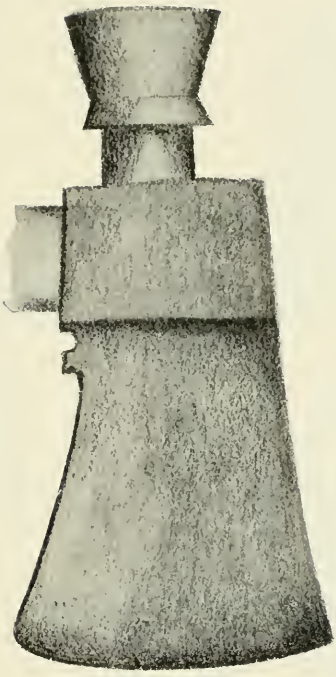

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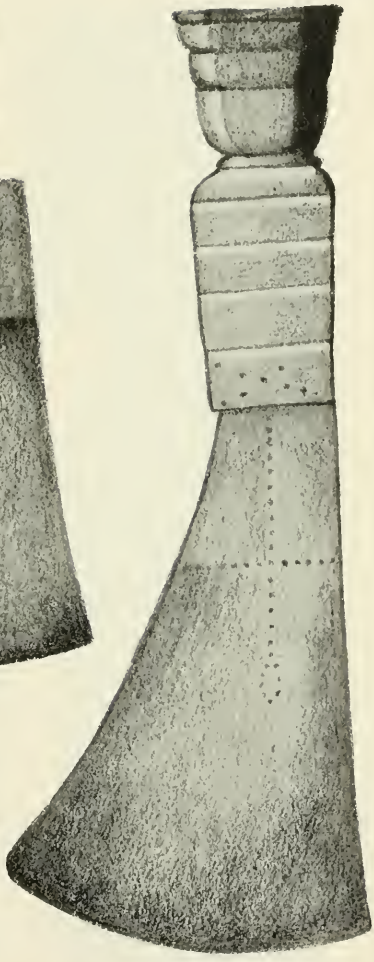

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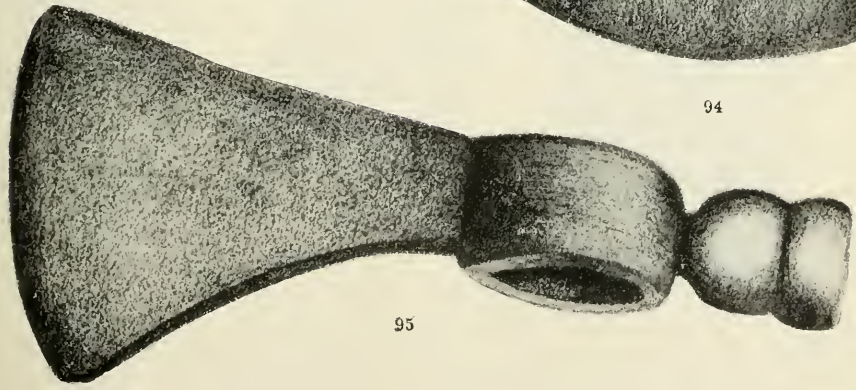

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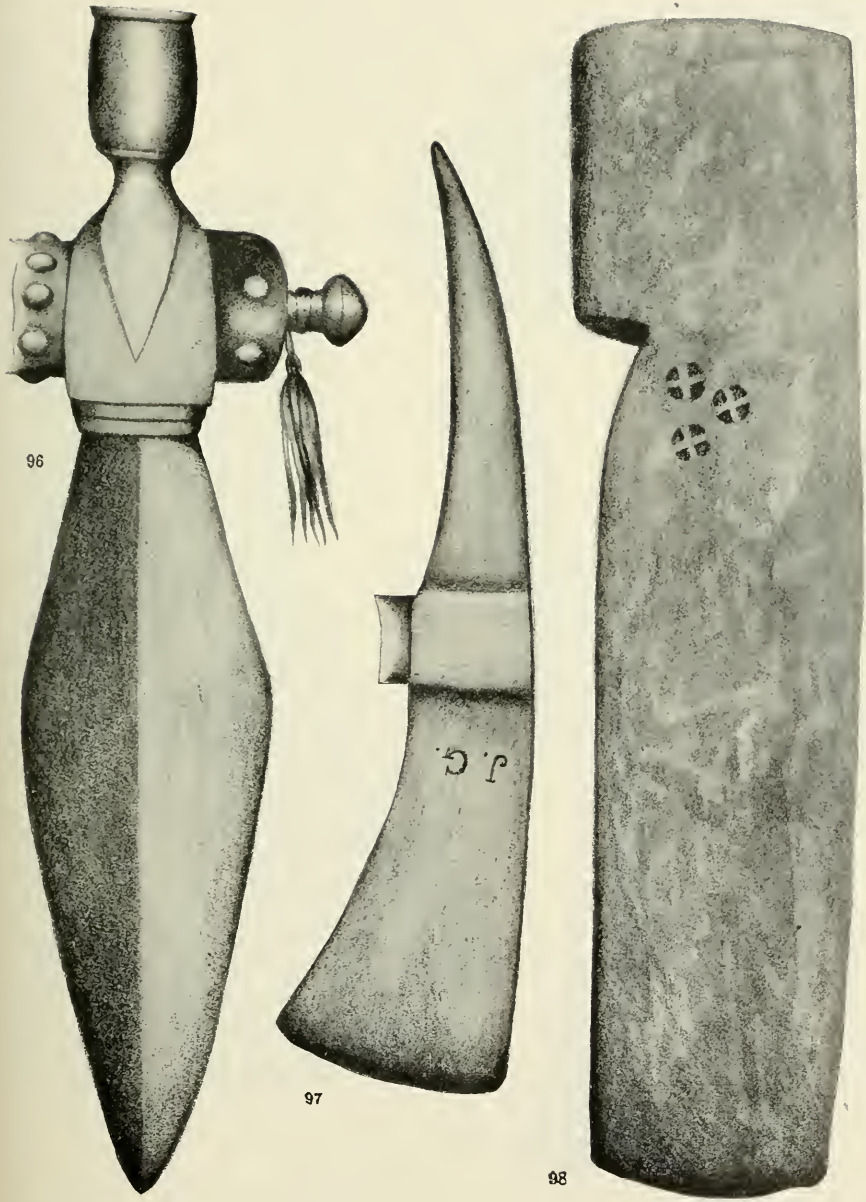
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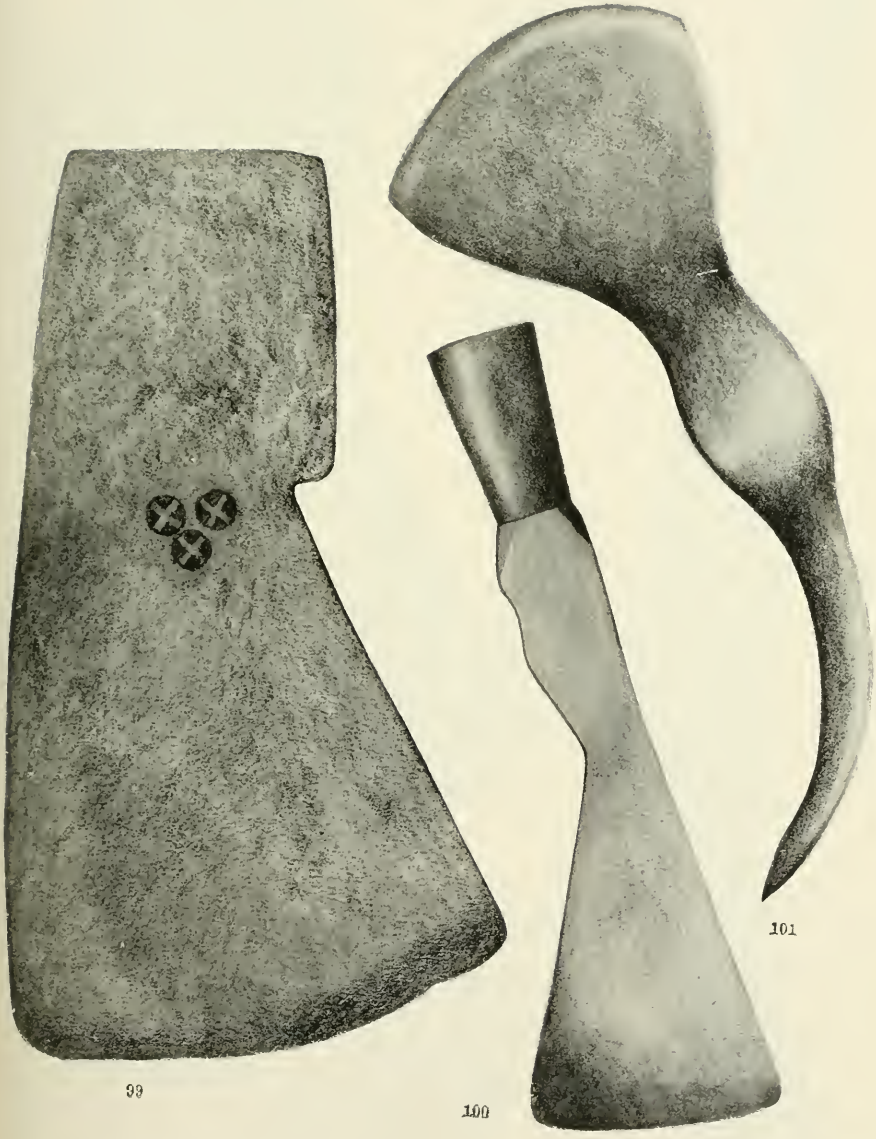
Plate 24



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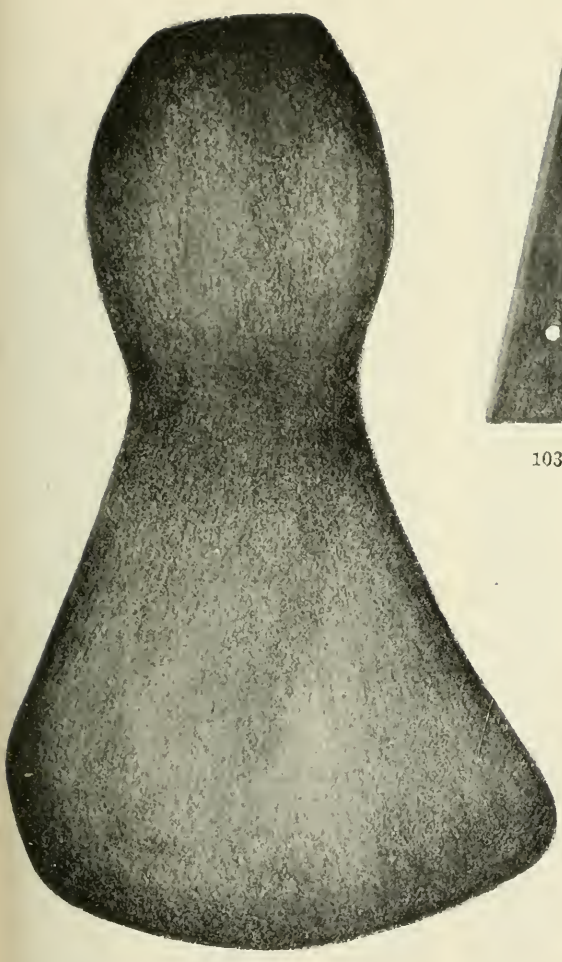

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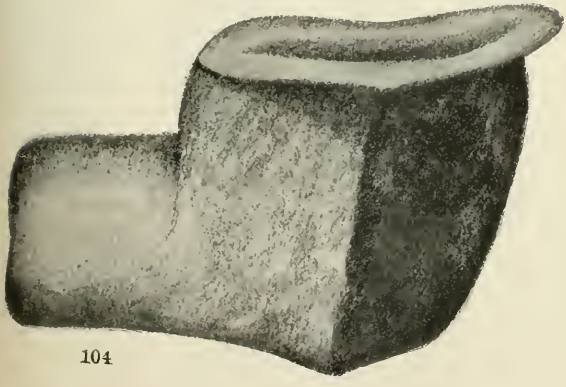

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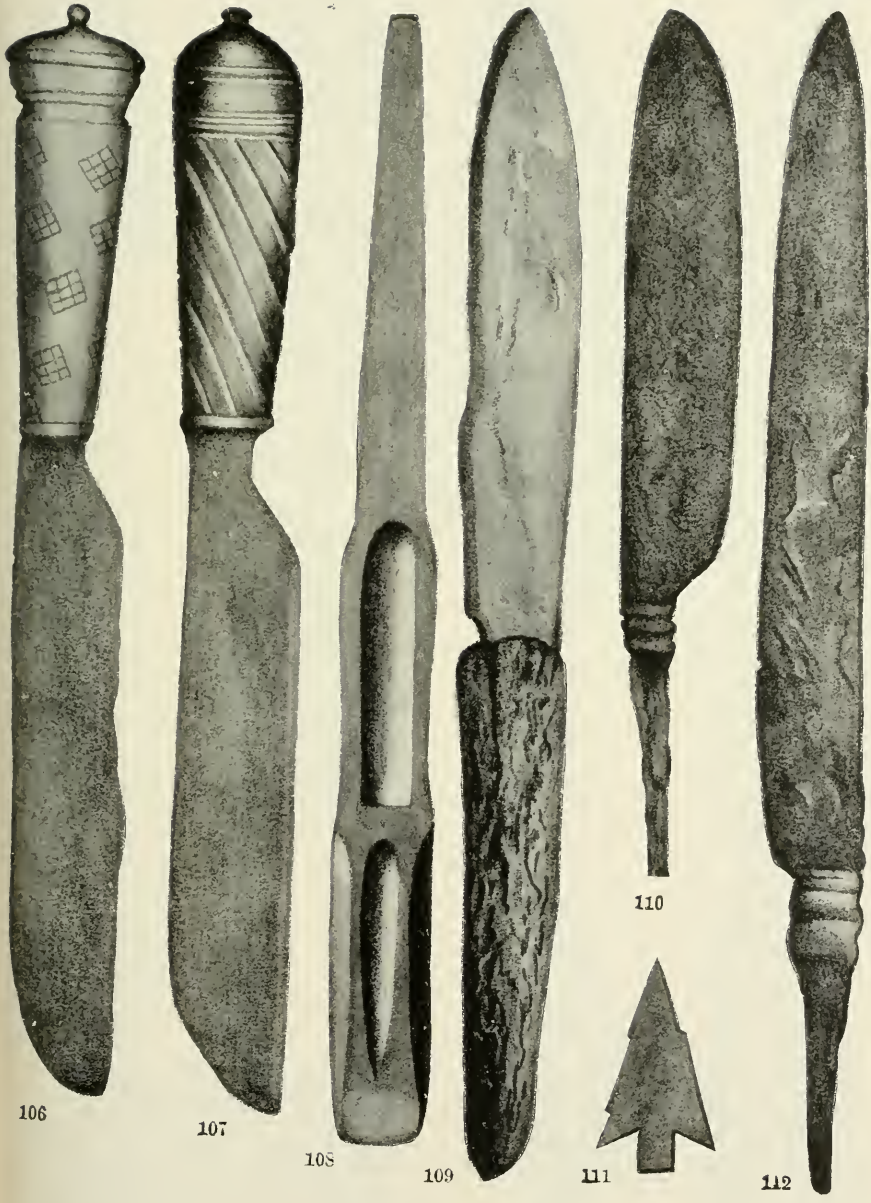

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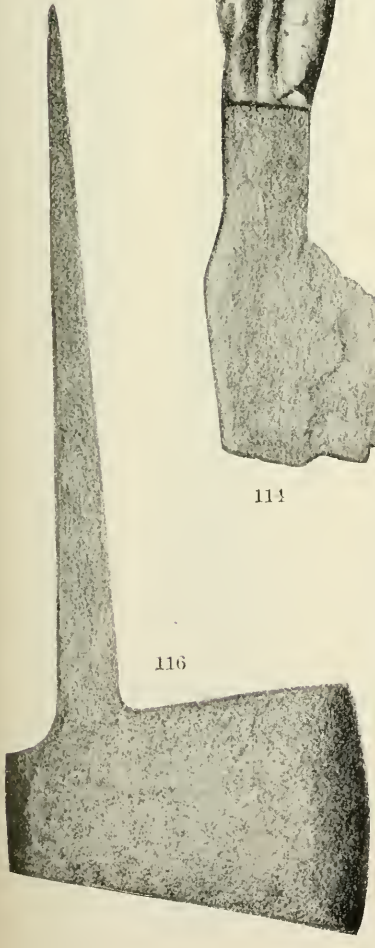

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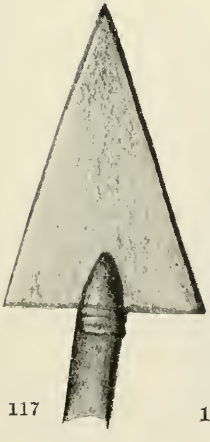

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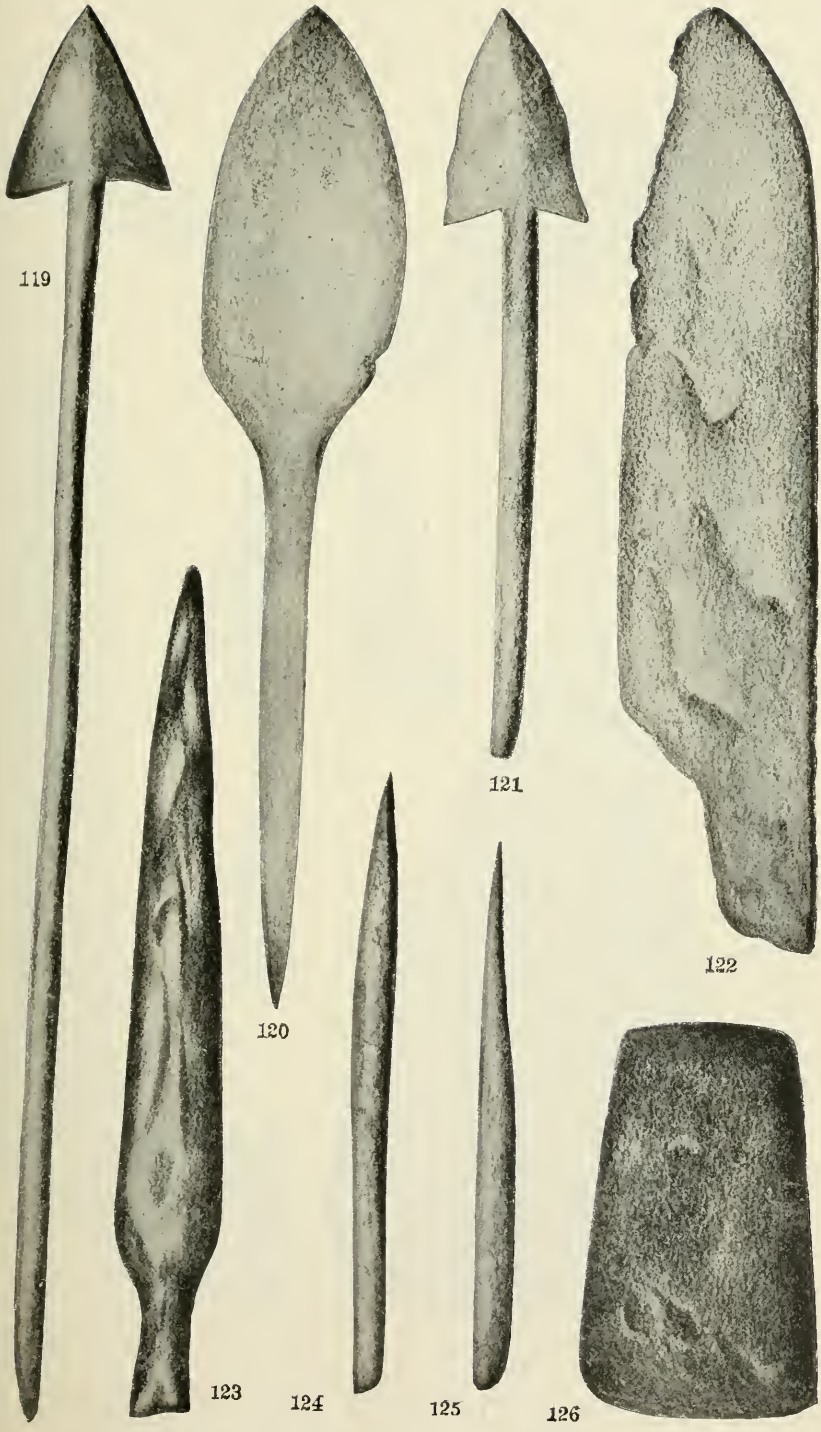
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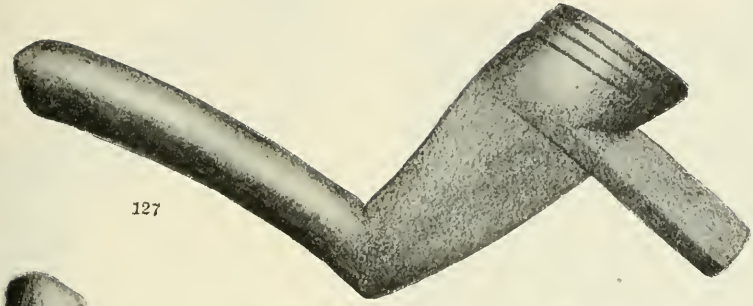

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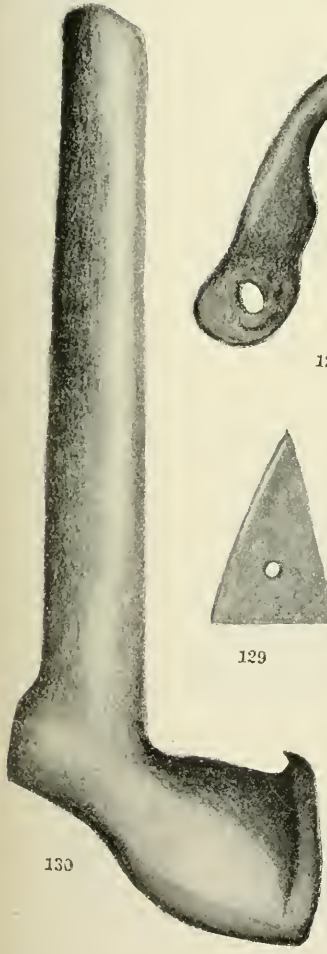

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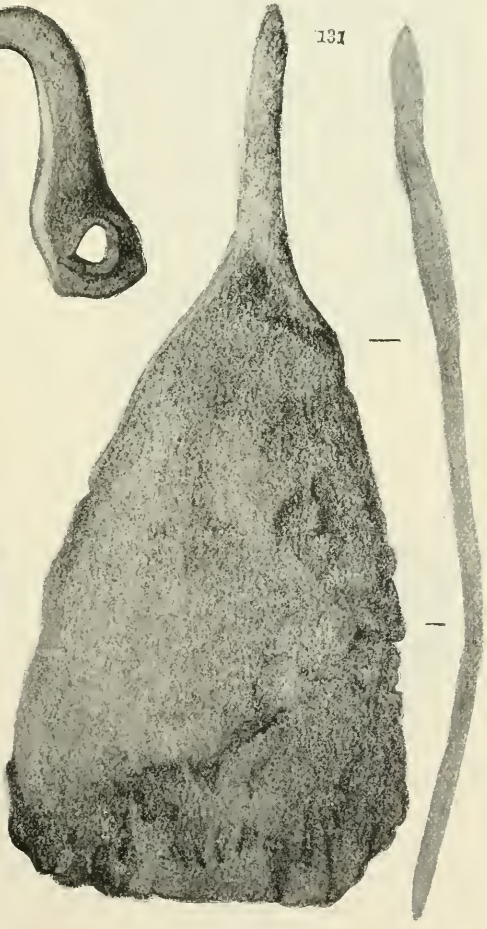

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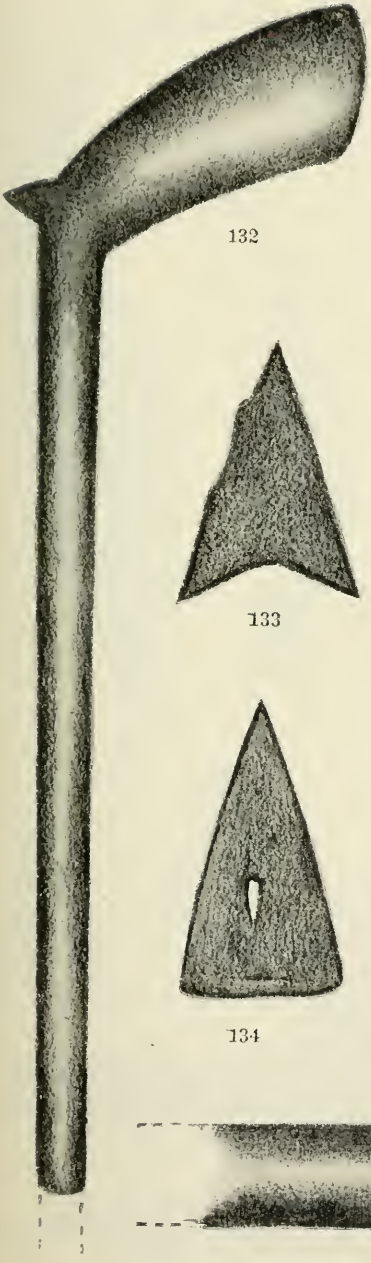

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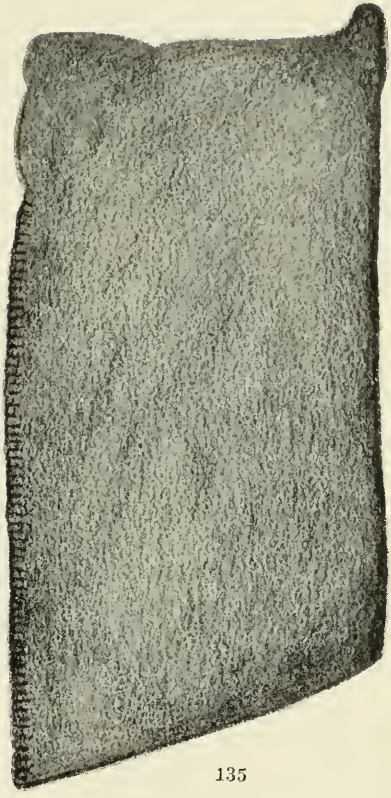

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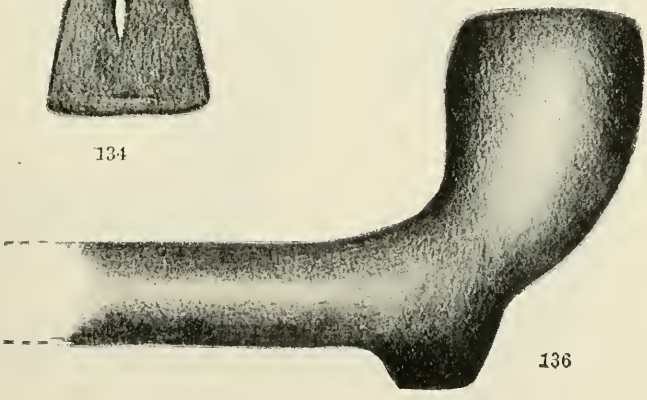

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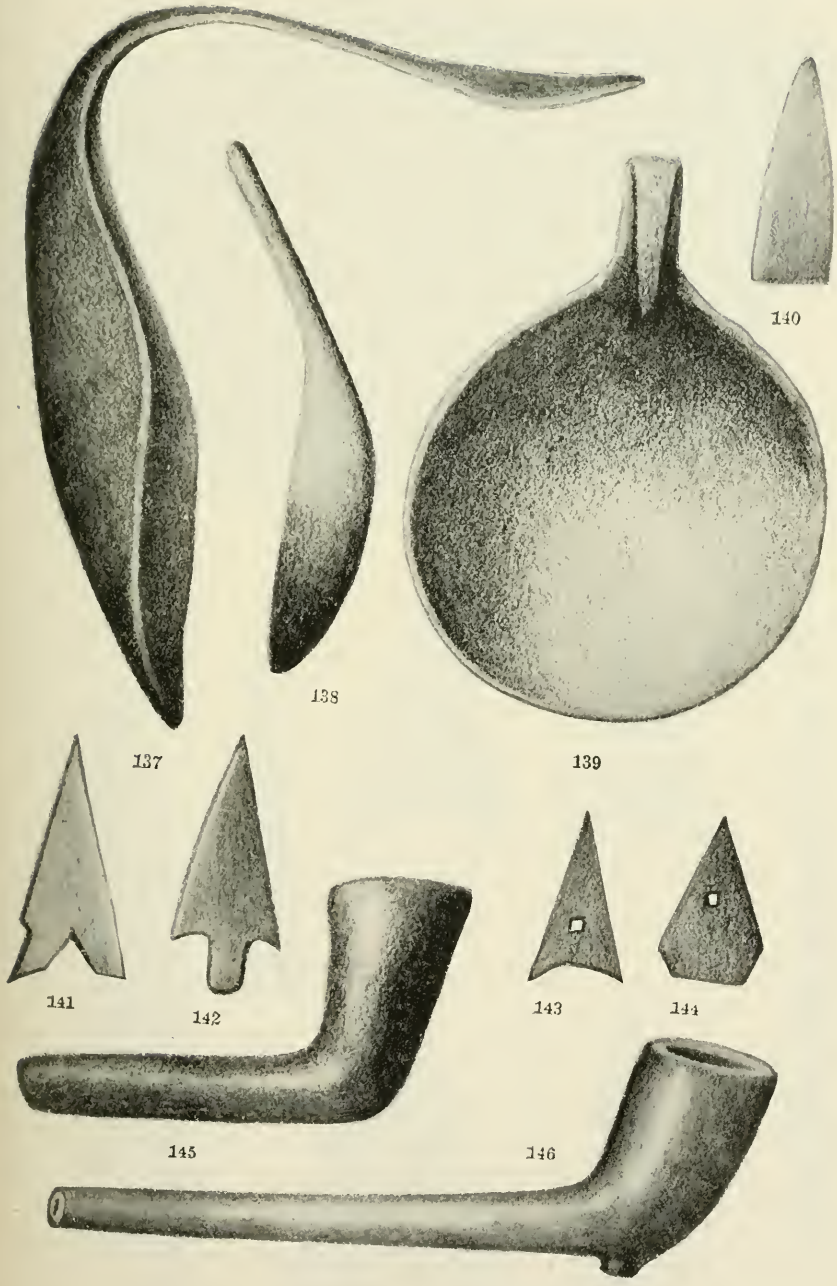
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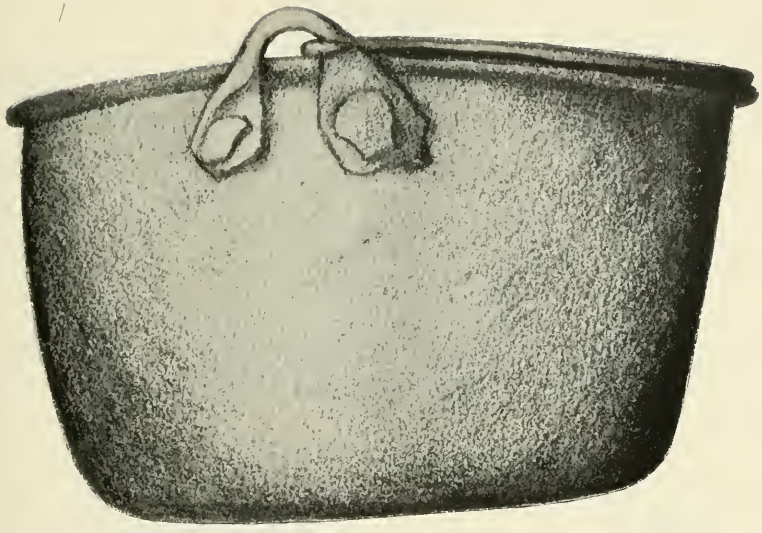

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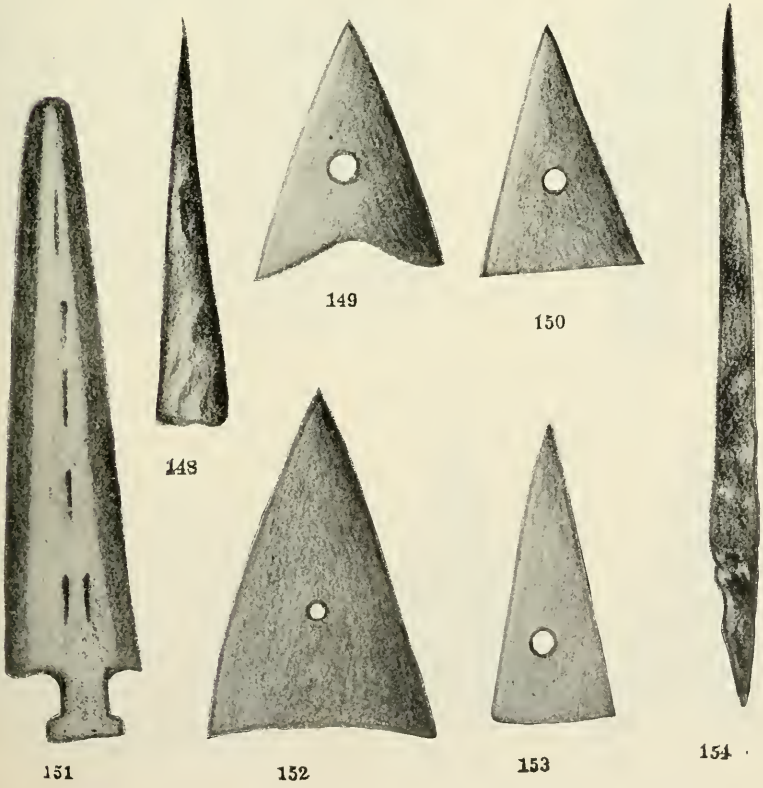

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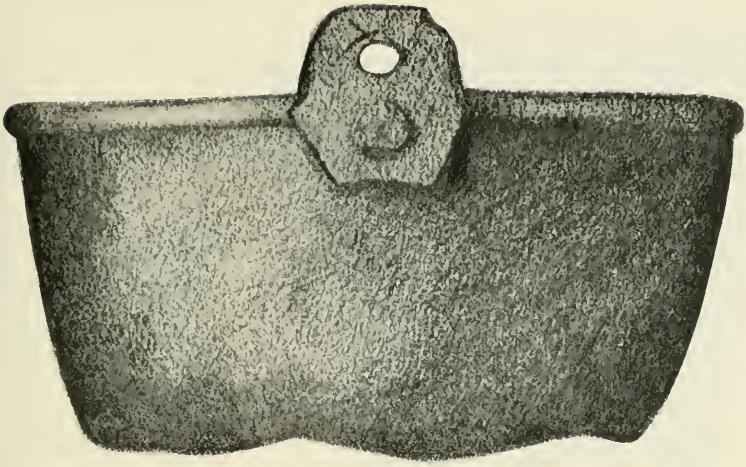

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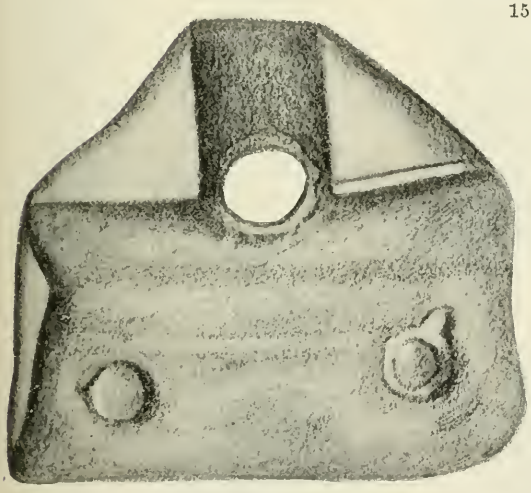

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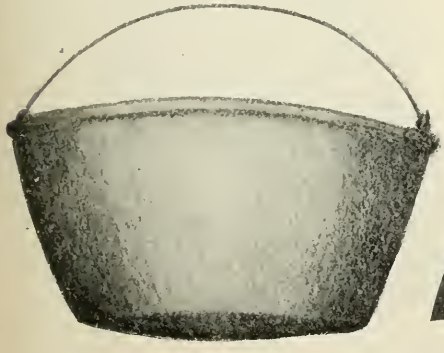

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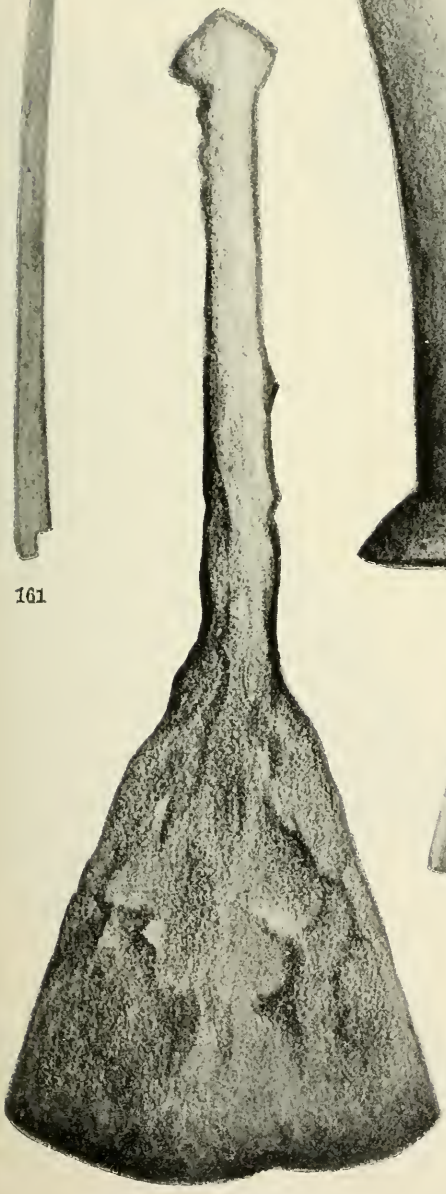

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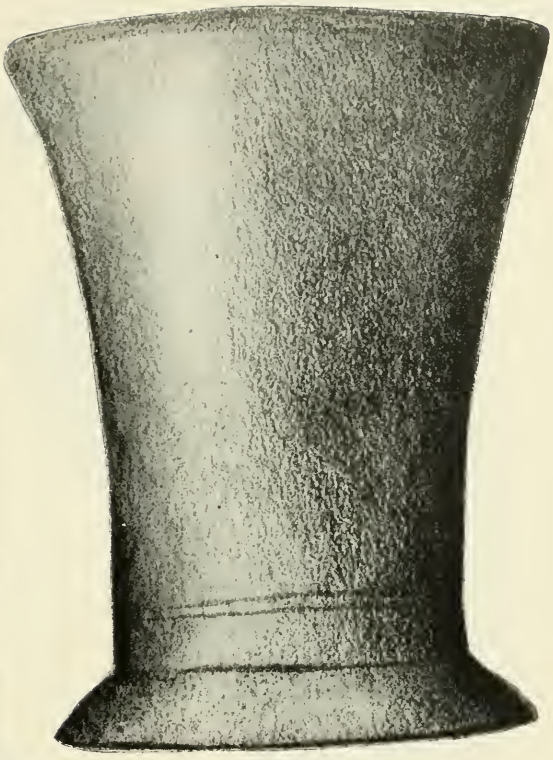

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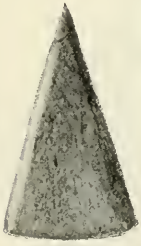

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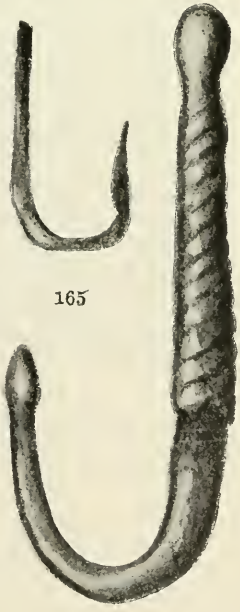

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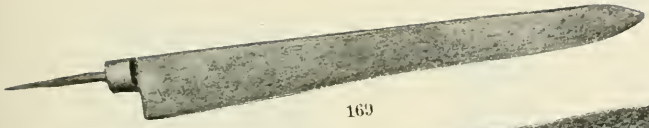

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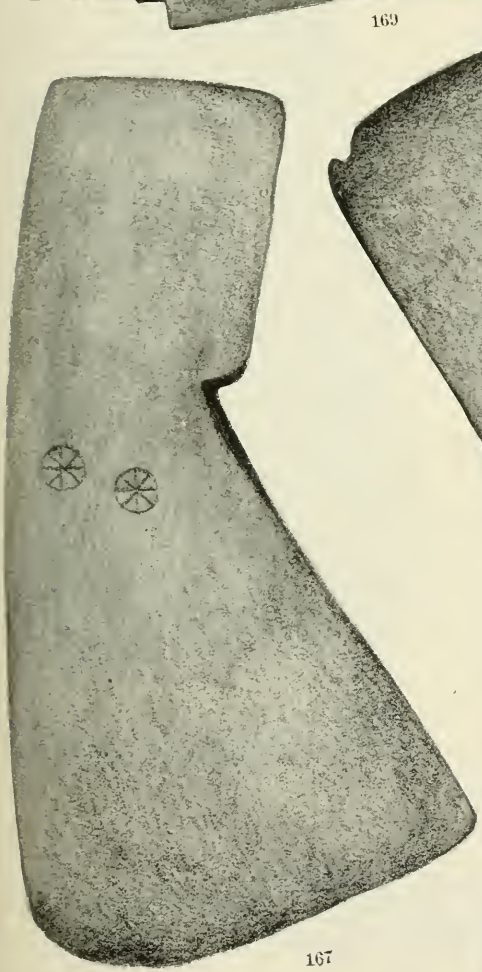

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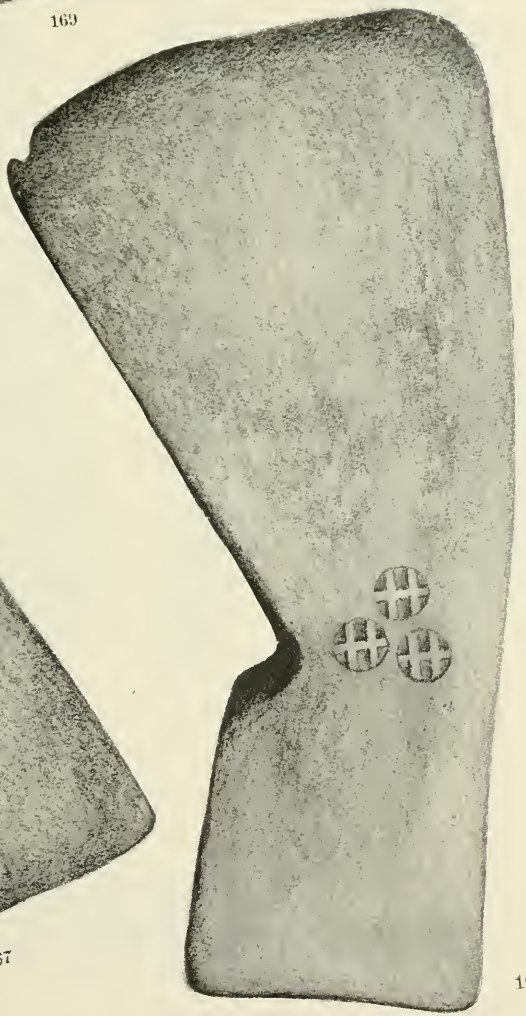

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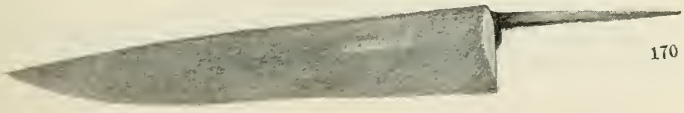

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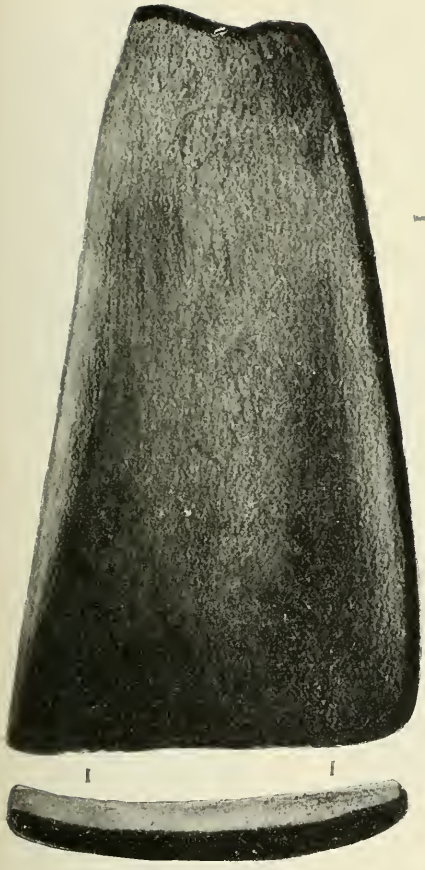

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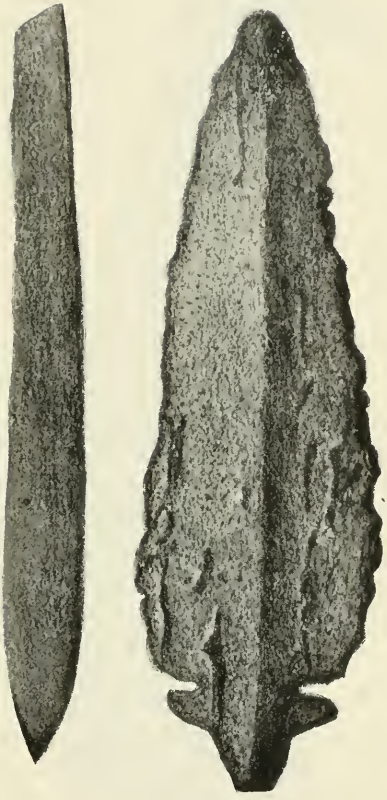

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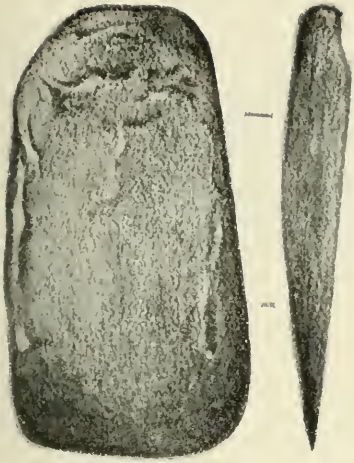

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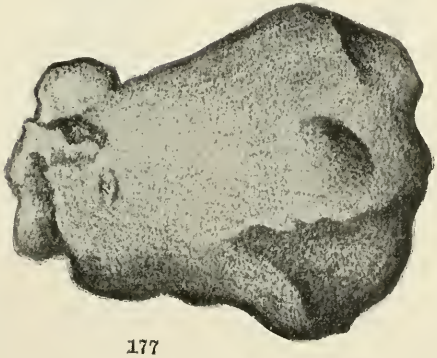

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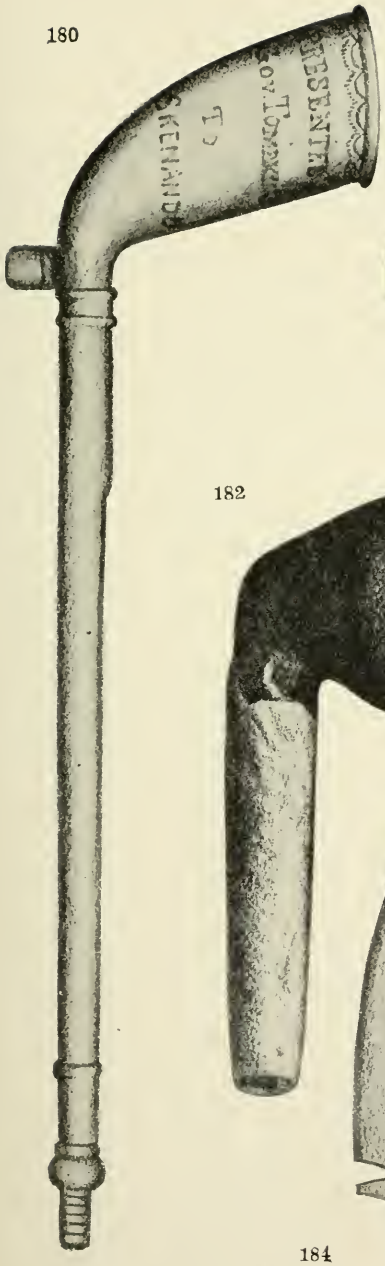
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New York State Museum

FREDERICK J. H. MERRILL Director

Bulletin 62

MISCELLANEOUS 1

NATURAL HISTORY MUSEUMS

OF THE

UNITED STATES AND CANADA

BY

FREDERICK J. H. MERRILL

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University of the State of New York

New York State Museum

Frederick J. H. Merrill Director

Bulletin 62

MISCELLANEOUS 1

NATURAL HISTORY MUSEUMS

OF THE

UNITED STATES AND CANADA

PREFACE

The lack of general and specific information concerning the natural history museums of this country and their collections has made it seem important to collate for publication all facts concerning these educational mediums which could be obtained directly or otherwise.

With this aim, circular letters have been sent to all institutions where collections or museums exist, asking for full details. From the replies received, the following directory has been compiled and while many errors and omissions may be found in this first edition, the aid of museum curators and administrative officers throughout the country is solicited, in the attempt to make the publication accurate and reliable.

To my assistants Mr J. N. Nevius and H. H. Hindshaw, who have greatly aided me in the compilation, I desire to express my obligations.

Frederick J. H. Merrill

Albany, July 1902

UNITED STATES

ALABAMA

Alabama polytechnic institute museum, Auburn. P. H. Mell, *director state experiment station* in charge; G. F. Boyd, *assistant.* The fire that destroyed the main building in 1887, swept away the museum which contained a very full representation of all branches of science and was one of the best in the south.

Palæontology. Several hundred specimens representing several formations including the Claiborne of this state; a small collection of fossils from the Paris basin representing to some extent the different formations.

Mineralogy. 600 specimens.

Historic and economic geology and lithology. 100 specimens.

Zoology. 75 specimens, a few representing the local fauna.

Botany. 40,134 specimens: 16,950 fungi; 1006 lichens; 588 algae; 20,606 flowering plants.

Ethnology and anthropology. A few specimens.

Geological survey of Alabama, University. Eugene A. Smith, *state geologist;* Henry McCalley, *assistant.*

Geology and palæontology. About 75,000 specimens comprising about 15,000 catalogue titles: three fourths illustrative of Alabama geology, and the remainder of a general nature.

Mineralogy. 4800 specimens.

Zoology. 8100 specimens: 900 skins of Alabama birds; 200 fishes and other marine forms; and 7000 recent shells.

Botany. 4300 Alabama plants, flowering plants and cryptogams about equally represented: 1000 foreign plants mostly cryptogams.

Ethnology. 435 relics of North American Indians.

Total. 26,000 entry titles, and 94,000 specimens.

Howard college, East Lake. No report.

Southern university, Greensboro.

Small general collection.

ARIZONA

University of Arizona, Territorial museum, Tucson. Herbert Brown and professors in various departments, *curators.*

Paleontology. Collections of Arizona fossils, Devonian corals, etc. Horn cores of Bos arizonica.

Mineralogy. 2500 specimens: a series illustrative of the physical properties of minerals, showing color, luster, hardness, etc.; miscellaneous specimens, principally ores of the useful metals, from Arizona localities; a series of copper minerals from the Copper Queen mine at Bisbee; some foreign material, and the 86 pound Weaver meteorite.

Economic geology. Copper ores from Bisbee, ores and metallurgic specimens from the gold, silver and lead mines of the territory; gypsum clays, cement, and a partial series of building stones.

Lithology. 3000 specimens: illustrating the rock formations of the territory; collection of typical rock species purchased from Krantz of Bonn, and a suite from the United States geological survey.

Zoology. 1500 specimens: a miscellaneous representation of mammals, birds and reptiles, mostly from Arizona, including the Brown collection of 1200 skins of Arizona birds.

Botany. 10,000 specimens, United States and Mexican plants. 2500 specimens in the botanical survey herbarium illustrating the Arizona flora. A special feature of the herbarium is its completeness in the order Cactaceae represented by more than 1000 mounted specimens and as many more unmounted duplicates.

Ethnology and archeology. Specimens of ancient and modern aboriginal pottery from the pueblos and cliff houses of Arizona. Stone implements. Historic relics of the Spanish conquest. Skulls, clay images. Suites of figures illustrating the dress of the Yuma Indians and Mexicans.

ARKANSAS

Hendrix college museum, Conway. G. L. Harrell, *director.*

Mineralogy. 800 specimens arranged in economic groups and including gold, silver, lead, zinc, iron, copper, antimony, calcium barium and silicon. Specimens include native gold, native silver

and galena from Colorado; sphalerite, smithsonite, pyrite, malachite and stibnite from Arkansas; antimony and calcite from England, Bohemia and Mexico; smithsonite from Greece; stibnite from Utah.

Historic and economic geology and lithology. 72 specimens: representative of the Carboniferous, Subcarboniferous, Niagara and Trenton.

Zoology. 100 specimens: serpents, insects and mollusks.

University of Arkansas museum, Fayetteville. A. H. Purdue, *professor of geology.*

Paleontology. 1800 specimens: 300 vertebrates; 1000 invertebrates and 500 plants.

Mineralogy. 2000 specimens: 200 mineral species, mostly oxids, sulfids and silicates.

Economic geology. 50 specimens of building stones; 200 specimens representing the carbonates, sulfids, oxids and silicates.

Petrography. 300 specimens.

Historic geology. 13 relief maps.

Zoology. 2900 specimens: 80 species of mammals and birds (200 specimens); 40 species of reptiles and amphibians (200 specimens) and 18 skeletons; 350 species of fish (1500 specimens); 200 species of insects and other invertebrates (1000 specimens).

Botany. 3500 specimens, illustrating 1500 species.

CALIFORNIA.

California academy of sciences, San Francisco. *See* Addenda, p. 221.

Golden Gate Park museum, San Francisco. C. P. Wilcomb, *curator.*

Collections are small as this museum is only six years old. It consists of 25 distinct departments and is in a well equipped building.

Paleontology. 2000 specimens and 250 species of fossils.

Mineralogy. 2322 specimens.

Zoology. 24,000 specimens: mammals, birds, fishes and miscellaneous objects of natural history.

Botany. 404 specimens in forestry.

Ethnology. 3416 specimens.

Leland Stanford Junior museum, Stanford University. Harry C. Peterson, *curator;* Edwin A. Austin, *assistant curator;* Daniel V. Noland, *assistant graphic arts;* George M. Shindo, *assistant Japanese dep't;* T. Shibata, George Slade, Robert Godwin, Adelin Martin, *museum assistants.*

Mineralogy. Principally Pacific coast specimens, also collection of Ural mountain ores.

Zoology. A representative collection of birds, birds eggs, seals, etc.

Ethnology. Series of Di Cesnola's material from Cyprus; Indian remains and fabrics, Alaskan material, very complete collection of stone age specimens from Denmark; a comprehensive collection of Chinese, Japanese and Korean material, also Egyptian, Assyrian, Sudanese and Bisharin collections.

Archeology. Large collections of fine arts, nearly all the gift of Mrs Stanford.

Leland Stanford Junior university, Stanford University. Museum staff: Charles H. Gilbert, *professor of zoology,* in charge of museum; Edwin C. Starks, *curator;* Michitaro Lindo, *assistant.*

Paleontology. Californian Carboniferous, Californian Triassic, Californian Cretaceous, Californian Tertiary and marine Pleistocene, each with large quantity of undescribed material. Not yet listed, but specially full for Triassic, Tertiary and Pleistocene. Chiefly invertebrates. Yates collection of invertebrates and the Law collection of Mollusca are deposited with the department of geology and used constantly in instruction.

Specimens of Carboniferous, Cretaceous, Tertiary and Pleistocene (all invertebrates) of California for exchange.

Mineralogy. Collection illustrating the minerals of the crystalline rocks of New England; local set illustrating the rock-forming minerals of California.

Historic and economic geology. Zinc and lead ores of Missouri; building stones and clays of Arkansas; U. S. geological survey, Eureka, Nevada set; gold and silver ores, manganese ores of Brazil, Arkansas and Georgia; phosphate rocks of the United States.

Lithology. Set illustrating the types of igneous rocks of California, specially complete in granitic rocks. Igneous rocks of Arkansas; igneous and metamorphic rocks of Brazil, Wisconsin and Michigan. Set illustrating the metamorphic rocks of California; a set illustrating the geology of the Lake Superior region. U. S. geological survey educational set of rocks. Collections of crystalline rocks from various parts of the west. Some specimens of the crystalline rocks of California for exchange.

Zoology. Collections consist of 15,346 jars of fishes entered besides large collections of Japanese, Hawaiian and Philippine collections not entered; 1100 jars of batrachians; 5000 jars of reptiles; 5317 bird skins; 2400 mammal skins; 250 fish skeletons. Invertebrate collections not entered. In entomology, 260 trays of mounted insects, a cabinet of alcoholic specimens, about 5000 microscope slides illustrating development and variation, special collections from Japan, Galapagos and Samoan islands, a large collection of Coccidae and the most important existing collection of Mallophaga. Specimens of vertebrates and invertebrates for exchange.

Botany. Mounted sheets chiefly Pacific North American plants; unmounted specimens of all observed spermophytes on Santa Cruz Mt peninsula. Deposited by professor of botany, 1) collection of California plants chiefly from Inland, Nevada and Monterey counties; 2) collection of plants of central New York—spermophytes to fungi; 3) collection of marine algae from Woods Hole. Some specimens of California spermophytes for exchange.

San Diego society of natural history, San Diego. Daniel Cleveland, *president.*

Small collections of geologic material.

Santa Clara college museum, Santa Clara. A. Cichi in charge.

Paleontology. 1000 specimens: Ward's college collection; a good collection of corals and some of Von Zittel's charts.

Mineralogy and geology. 2300 specimens: 250 specimens from France; 1020 specimens from Germany, and over 1000 specimens of ores from California and Nevada mines.

Zoology. Collection of skulls of different classes of mammals; 120 alcoholic specimens of invertebrates from Lenoir & Forster, Vienna; 101 Leuchardt charts; 100 Gerold's charts.

Botany. 1500 specimens of plants and a fine collection of Brondel's models in hardened gelatin, illustrating specially the fertilization of cryptogams, mosses, molds, bacteria, etc.

Ethnology and anthropology. A collection of skulls of the different races of men.

The museum also contains a collection of relief maps.

State mining bureau, San Francisco. L. E. Aubury, *state mineralogist;* J. M. Cline, *curator.*

15,750 specimens: ores, minerals, rocks, etc., principally from California and the Pacific coast, but to a small extent representing the whole world.

One side of the museum is devoted to California. Collections are arranged by counties and districts; and there are 32 cases of gold quartz, five of silver ores, five of copper, four of quicksilver, one of iron, one of chrome iron ore, and two of the ores of manganese, antimony, lead, zinc, etc. Marbles and building stones of the state are also represented.

On the opposite side of the museum are 34 cases of crystallized minerals, largely from California, but also foreign. These are arranged mineralogically: two cases of iron, two of copper, one of manganese ores, etc.

There is also a series of economic minerals, such as borax, niter, sulfur, alum, crude and refined oils, asphalt, coals, clays, gypsum, etc., chiefly from California, arranged to show the state resources.

The vestibule is largely devoted to paleontology, and contains some ethnologic and historic specimens.

There are also many models of mining machinery and mine timbering, photographs and maps.

University of California, Berkeley. J. C. Merriam *professor of paleontology;* A. C. Lawson *professor of mineralogy and geology;* W. E. Ritter *professor of zoology;* William Albert Setchell *professor of botany;* A. L. Kroeber *professor of ethnology and archeology.*

The heads of the various departments are in charge of the collections.

Paleontology. Collections made by the California geological survey: type or representative specimens of all known California fossils; splendidly preserved fossils illustrating the paleontology of the state; a large series illustrating the development of invertebrate life in North America and a carefully selected series of crinoids from Crawfordsville Ind.

Mineralogy. A very large systematic collection and a series of glass and wooden crystal models.

Economic geology. Sets of specimens from mines on the Pacific coast: gold, silver, mercury, iron, copper and coal, showing for each mine the ores, veinstones, wall rock, and other important features.

Structural geology. Fine models of the more interesting geologic regions, chiefly in the United States containing an excellent relief map of the peninsula of San Francisco from 37° 30′ to the Golden Gate, on a scale of 2 inches to the mile.

Lithology. Many hundred rock specimens from the eastern states and territories, England and the European continent, and a large number of California rocks collected by the state geological survey; also 3600 slides for microscopic study.

Zoology. Good collections of both invertebrates and vertebrates. The collections of marine invertebrates from the Pacific coast, specially of the groups Coelenterata, Crustacea, Echinodermata, Annelida, Bryozoa, and Tunicata, are rich and are being rapidly increased. There is a large type collection of California molluscan shells, and besides a general collection in the same group of 2300 specimens. In entomology the agricultural department possesses a collection of over 2000 determined species of beetles. There is also a large collection of Lepidoptera. The collections of amphibians, reptiles, birds and mammals are fairly representative of the California fauna in these groups. The collection of Alaska birds and mammals is good. The collection of vertebrate skeletons has been greatly enriched recently through a gift of about 50 new types. These were

selected with the view of supplementing the forms already possessed; and the collection of types is now complete for the purposes of general instruction in comparative anatomy. The large Alaskan collections recently given to the university by the Alaska Commercial Company have been recently transferred to the new ferry building in San Francisco for temporary exhibition, and the natural history specimens are there available for study by students carrying on investigations.

Botany. Some thousands of specimens of California plants, of which over a hundred are new species; a representation of woods, cones and tree photographs; several hundred specimens from the southern part of the state; a herbarium of the United States grasses; an excellent representation of the flora and silva of the southern Atlantic states; 1000 specimens from Oregon, Washington and North Dakota; a fine representation of the Australian flora; several thousand specimens from eastern United States; 4000 specimens of ferns, mosses, hepaticas, marine algae, fungi, etc., and also the algae, fungi and lichens of Prof. Setchell.

Ethnology and archeology. Many stone implements and skeletons obtained from mounds and river gravels of the Pacific coast, some presented by D. O. Mills and many more recently collected by various expeditions sent out by Mrs Phebe A. Hearst; wooden and stone implements, and other articles illustrating the manners and customs of the people of the Pacific islands, presented by F. L. A. Pioche; rich Peruvian collections; Indian utensils, a series of models of the cliff dwellings of New Mexico and Arizona. Recently the Alaska Commercial Company has presented to the university its collection illustrative of the habits of life of the Eskimos of Alaska and the Behring sea. This collection has been in process of accumulation for many years, and is very rich. Extensive collections in Egyptian archeology are being constantly received from investigations carried on in Egypt through the support of Mrs Phebe A. Hearst.

The collections belonging to the university were obtained from several sources. 1) The state geological survey contributed the

extensive collection of minerals, fossils, marine and land shells, and skins of California birds which were the type specimens of the species described in its ornithologic report; a set of Ward casts of selected types of the larger fossils was added later. 2) The Pioche collection of South American shells, fossils, minerals and ores illustrative of Pacific coast forms. 3) California land shells and native ores and rocks from D. O. Mills. 4) A costly mineral collection of James R. Keene. 5) The expeditions of the various natural history departments. Type specimens of new species and specimens illustrating various facts in the natural history of California's marine fauna are placed in the museum. 6) The extensive collections in Alaskan ethnology and natural history from the Alaska Commercial Company. 7) The explorations in Egypt, Greece, Peru and California conducted at the expense of Mrs Phebe A. Hearst.

University of southern California, University station, Los Angeles. Albert B. Ulrey, *professor of biology.*

Paleontology. 2950 specimens which are now being arranged for exhibition. Material for exchange.

Mineralogy. 3700 specimens. Material for exchange.

Historic and economic geology and lithology. 1000 specimens.

Zoology. 22,300 specimens: 525 birds and 125 birds eggs, 350 other vertebrates including a fairly large series of fishes and Kansas snakes; series of corals and other marine invertebrates; a small collection of insects, and 19,500 mollusks. A complete collection of vertebrates from the island of Santa Catalina is being made.

Botany. 5000 specimens; collectors are now at work in the interest of this department. Material for exchange.

Ethnology. 730 specimens. Material for exchange.

COLORADO

Bureau of mines of the state of Colorado, capitol, Denver. Harry A. Lee, *commissioner.*

The collections are all of an economic and mineralogic nature including a complete collection of the minerals and ores of the

state of Colorado, arranged by counties; a series of its coal, coke and iron products; samples of the massive ores of the various mines in the state and the Dr Ellsner collection of minerals from all parts of the world.

Colorado college and Cutler academy, Colorado Springs. No report.

Colorado scientific society, Boston building, Denver.

Classified collection of minerals, rocks and fossils on exhibition daily except Sunday.

Colorado school of mines, Golden. H. B. Patton, *professor of geology and mineralogy*, in charge.

Paleontology. A display collection mainly of fossils, 342 specimens and a miscellaneous collection of 1360 specimens.

Mineralogy. A display collection of Colorado minerals, 1305 specimens; a type collection, 3700 specimens; a supplementary collection of the rarer species, 950 specimens; a working collection of 21,000 specimens; and a crystallographic collection of 950 specimens; the R. C. Hills collection of minerals, a collection of the coals of Colorado, Wyoming and New Mexico, 800 hand specimens and slides of Colorado and New Mexico eruptive rocks. Prof. Patton's private collection of 970 specimens is displayed.

Historic and economic geology and lithology. A type collection of rocks consisting of *a*) a general collection *b*) a series of Colorado rocks, 1800 specimens; a working collection of 17,400 specimens and the U. S. geological survey educational series of rocks, 156 specimens. Prof. Patton's private collection of 1700 lithologic specimens is also exhibited.

The museum has many specimens to exchange.

Mining and metallurgy. Excellent set of models of furnaces, mills, crushers, with models of mines, examples of timbering, etc.

State agricultural college, Fort Collins.

The collections are in charge of the heads of the several departments: W. P. Headden, *paleontology and mineralogy;* Wendell

Paddock, *botany and horticulture;* and Clarence P. Gillette, *zoology*, in charge.

Paleontology. About 550 choice specimens.

Mineralogy. 400 typical specimens.

Lithology. 1672 hand specimens of rocks.

Economic geology. 1000 specimens of ores.

Zoology. 60,000 specimens, including 55,000 insects exhibited in good form for study. Also 13 mounted skeletons of vertebrates; a number of skulls; 75 mounted mammals, 300 mounted birds; 60 bird skins and 700 birds eggs; a mounted collection, 300 specimens, of sponges, corals, mollusks and crustaceans. Also an economic collection of 200 specimens of plants injured by insects, and 200 honey-bearing plants; a series of wax models illustrating the segmentation of the egg and the development of the chick; and models of several parts of the human body, including the eye, ear, throat and larynx. A large number of Colorado insects are for exchange.

Botany. 7000 specimens: 1000 species of Colorado phanerogams and 2500 from other states; 300 species of Colorado fungi and 2000 from other states. 4000 specimens for exchange.

Ethnology. Small collection.

University of Colorado museum, Boulder. Nevin M. Fenneman, *professor of geology*, and Francis Ramaley, *professor of biology*, are in charge of the collections.

Paleontology. 500 partly labeled specimens.

Mineralogy. 700 exhibition specimens, a study set of about 400 mineral specimens, and 75 microscope slides of minerals. In the economic collections is a set of 600 specimens of characteristic ores of Colorado particularly rich in tellurids.

Lithology. 400 specimens of typical rocks; 140 specimens of typical rocks of Cripple creek region (the G. H. Stone collection); the United States geological survey educational series of rocks; 75 specimens illustrating geologic structure; and 360 microscopic slides of typical rocks.

Zoology. 600 specimens: a series of vertebrate skeletons; a set of North American fishes, from the Smithsonian institution;

a fairly complete set of invertebrates, both alcoholic and dry specimens; besides 1000 microscope slides in zoology, embryology and histology. This material is reserved for class use almost exclusively, and to give thorough training in laboratory work.

Botany. 4000 herbarium specimens: a large amount of alcoholic material, representing all groups of plants, for laboratory use; many West Indian, west American and Mediterranean algae; a good selection of microscope slides, specially of rare material in anatomy and cytology.

University of Denver, Denver.

No report.

CONNECTICUT

Connecticut agricultural college, Storrs. Rufus W. Stimson in charge.

Paleontology. 500 specimens.

Mineralogy. 700 specimens.

Historic and economic geology and lithology. 900 specimens.

Zoology. 10,000 specimens: representing nearly every group of the animal kingdom. 50 to 75 species of marine invertebrates to exchange for Devonian and other fossils.

Botany. 1500 specimens: general flora of Connecticut.

Ethnology. 75 specimens: Indian implements.

Peabody museum of natural history, Yale university, New Haven. Charles E. Beecher, *curator in geology and paleontology;* Addison E. Verrill, *zoology;* Edward S. Dana, *mineralogy;* George F. Eaton, *osteology.*

Paleontology. The very extensive invertebrate collections are arranged zoologically. There are some fine, large slabs containing fossils, on exhibition; also type collections showing the development, structure and classification of trilobites and brachiopods.

The vertebrate possessions include many of the finest specimens ever collected: collections made by Prof. Marsh, of vertebrate fossils from the Rocky mountain region and other parts of the west; specimens of toothed birds, mainly Hesperornis and

Ichthyornis, discovered by Prof. Marsh in the Cretaceous rocks of Kansas; specimens of the Miocene Brontotheridae from Dakota and Nebraska; remains of Dinocerata from the Eocene of Wyoming; two skeletons of the gigantic moa from New Zealand; a mounted skeleton of a large Cretaceous dinosaur, Claosaurus; remains of Atlantosaurus, the largest of known land animals; the mounted pelvis and hind limbs of Brontosaurus, and a skull of Triceratops from the Cretaceous of Wyoming.

Mineralogy. The Gibbs collection, deposited by Col. George Gibbs; private cabinet of Prof. Brush, for study and investigation only and not for general exhibition; one of the largest collections of meteorites in the country, containing the famous mass of meteoric iron weighing 1635 pounds from Texas, some hundreds of large and small meteorites from a single fall in Iowa in May 1879, the interesting Weston meteorite which fell in Weston in 1807, and nearly 1000 meteorites from the great meteoric fall of May 2, 1890, in Winnebago county, Ia.; the large and beautiful collection of Chinese artistic work in stone, chiefly in jade and agates, bequeathed by Dr S. Wells Williams.

Historic and economic geology. Collections in laboratories for use of students.

Zoology. One of the most complete collections of corals in the country; a collection of marine invertebrates from New England; shells and corals from the Pacific coast of America, corals of Bermuda, and shells of Florida, etc.; models of two of the huge cephalopods of the world, one an octopus and the other a species from the Newfoundland seas, related to the squids; skeletons deposited by Prof. Marsh and a nearly complete series of the vertebrate species of New England are on exhibition.

Archeology and ethnology. Collections occupy the fourth floor of the museum.

Scientific association of Meriden, Meriden. Charles H. Stanley Davis, *corresponding secretary;* Willis J. Prouty, *curator.*

Collections not extensive. The late Prof. J. H. Chapin, of St Lawrence university, presented his collection of 2000 minerals to the association.

Geology. 1200 specimens, a portion of which are in the high school.

Trinity college museum, Hartford. Charles Lincoln Edwards in charge; Karl Wilhelm Genthe, *instructor in natural history.*

Paleontology. Typical fossils, originals and casts; among the latter are Icthyosaurus, Plesiosaurus, Mastodon, Dinotherium, Glyptodon, Megatherium and about 60 Ammonites.

Mineralogy. Type minerals, specially from New York and New England, also many European specimens.

Historic and economic geology and lithology. Models and photographs of volcanic and other important mountains; collections illustrating Vesuvian minerals and rocks and the Triassic formations of Connecticut; Ward collection illustrating the New York system of rocks; Ward stratigraphic collection, and Ward systematic collection of rocks (college series).

Zoology. Skeletons of mammals, birds nests and eggs, shells and corals; Blaschka glass models of Hydrozoa; Ziegler's wax models showing development of the frog and chick.

Botany. Herbarium of Nebraska plants.

Ethnology and anthropology. War clubs, arrowheads, pipes, dresses, pottery, etc., and material, including a skeleton, from the Santa Catalina islands.

Wesleyan university, Middletown. B. P. Raymond, *president*, in charge, assisted by W. N. Rice, *professor of geology*, H. W. Conn, *professor of biology*, and S. W. Loper, *curator.*

Palcontology. 15,000 specimens: including Lower Silurian fossils from Cañon City, Colorado, and Valcour island, Lake Champlain; Subcarboniferous fossils from Chattanooga Tenn., and Crawfordsville Ind.; a fine representation of Triassic fishes, and some fossil footprints of dinosaurs, etc. from the shales and sandstones of the Connecticut valley; lithographic limestone fossils from Solenhofen; a fine representation of Tertiary plants, insects, and fishes from Fossil Wy. and Florissant Col.; many casts of fossils made by Ward and others.

Duplicates of Triassic fishes from the Connecticut valley, and fossils from Cañon City Col. and Fossil Wy. for exchange.

Mineralogy. 13,000 specimens: fine material from both American and European localities; rich in minerals from Middletown, Portland, Haddam, and Chatham Ct.

Duplicates of Connecticut minerals for exchange, specially those from vicinity of Middletown.

Lithology. Collections general, with special exhibits of New Hampshire rocks and of the United States geological survey educational series.

Dynamic geology. Characteristic specimens showing the work of atmospheric, aqueous, organic and igneous agencies.

Zoology. 110,000 specimens: vertebrates of the United States; birds of the United States, marine invertebrates of the Atlantic coast; a large collection of molluscan shells, obtained chiefly by the purchase of the collection of Simeon Shurtleff M. D.; smaller collections of South American birds and Australian mammals. Duplicate shells for exchange.

Botany. 12,000 specimens: herbarium of 5000 species, including some of the collections of Joseph Baratt M. D.; specimens of woods, alcoholic specimens of fungi, etc.

Ethnology. 8000 specimens: relics of the North American Indians; weapons, implements, etc. from the South Sea islands; Chinese objects, most of which were collected by the Rev. M. L. Taft D. D., president of the college at Pekin; 3000 coins, exclusive of duplicates, among which is a large series of Chinese coins, many of which are ancient and rare, presented by Dr Taft.

DELAWARE

Delaware college, Newark. W. H. Bishop, *professor of agriculture and botany*, in charge also of *zoology;* T. R. Wolf, *professor of chemistry, geology and mineralogy,* in charge also of *palcontology.*

Collections general in character.

Paleontology. 250 specimens.

Mineralogy. 600 specimens.

Economic and historic geology. 300 specimens.

Zoology. 200 specimens, mostly invertebrates from the national museum.

Botany. 1000 specimens.

Society of natural history of Delaware, Wilmington. Mrs Gheretein Yeatman, Kennett Square Pa., *corresponding secretary.*

Paleontology. No collection.

Mineralogy. 1500 specimens, part of which are lent to the society, which, however, owns a fairly representative collection of Delaware minerals.

No duplicates for exchange; though Fred J. Hilbiber will exchange Delaware minerals for the benefit of the society.

Economic geology and lithology. Collections small.

Zoology. 400 specimens of the birds of New Castle county and a fine collection of Delaware moths and butterflies.

Frank Morton Jones will exchange.

Botany. 50,000 specimens: well made herbarium of about 11,500 species, generally from the United States and northward, but including forms from Mexico, West Indies and Europe, carefully prepared and arranged for use of students; a local herbarium called the "Edward Tatnall herbarium of New Castle county"; collection of diatoms, made by the late Christian Febiger.

No exchange material; but William M. Canby, Edward Tatnall, and J. T. Pennypacker will exchange for the benefit of the society.

Ethnology. Collections small.

State college for colored students, Dover. W. C. Jason, *president.* Collections small.

DISTRICT OF COLUMBIA

Catholic university of America, Washington. Edward L. Greene, *professor of botany.*

Botany. Between 30,000 and 40,000 specimens: the most complete collection extant of Rocky mountain and Pacific coast vegetation, gathered by Prof. Greene during 25 years of residence and travel, containing types of some hundreds of new species described by him since 1880; a nearly complete herbarium

of eastern and southern botany, with much material from Mexico, South America and Europe.

Duplicates of eastern and far western plants for exchange.

Columbian university, Washington. Howard L. Hodgkins, *dean.*

Small collections for teaching purposes and laboratory use.

Geology, ornithology, botany. Working collections.

Georgetown university, Coleman museum, Georgetown. George A. Fargis in charge.

Paleontology. 1500 specimens: invertebrates of the Upper and Lower Silurian and Jurassic formations; Tertiary fossils, specially those from the formations along the Potomac and Chesapeake rivers, and several fine specimens of tusks of the mammoth from Alaska.

Mineralogy. 4000 specimens: minerals from Mt Vesuvius; series of silicates; also a very complete separate collection of minerals from the District of Columbia.

Historic geology. 1100 specimens: a complete and carefully selected representation of rocks of all geologic periods.

Zoology. 10,000 specimens: mammals; birds and birds eggs; reptiles; batrachians; a collection of 200 fishes representing 50 different species; insects; crustaceans; mollusks; echinoderms, and a collection of corals and shells from Manila.

Botany. A very complete series of the woods, and representatives of the marine algae, mosses, ferns and phanerogams of the District of Columbia.

Ethnology and archeology. A very complete series of the Indian remains found in and around the District of Columbia; a fine collection of Alaskan curios, illustrating the dress and customs of the natives; a complete series of papal medals from Martin 5 to Leo 13 (1893); a large collection of ancient and modern coins; and some Chinese and Spanish weapons.

Howard university natural history museum, Washington. W. P. Hay, *professor of natural history.*

Paleontology. 500 specimens: mostly hand specimens for class use including Dakota fossil leaves, Paleozoic shells, and a few Tertiary vertebrates and mollusks.

Mineralogy. 800 specimens: best representative of Washington and vicinity; all specimens reserved for class use.

Zoology. 750 specimens: a few mounted birds; a good series of skeletons, many invertebrates in fluid and dry; and 300 microscope slides of Foraminifera, parts of insects, etc.

Botany. 2000 specimens: flora of the District of Columbia; a working collection of exogens; and 200 sections of trees.

Ethnology. A few Indian implements and some war relics.

United States national museum, Washington. Scientific and administrative staff: Samuel P. Langley, *secretary of the Smithsonian institution, keeper ex officio;* Richard Rathbun, *assistant secretary of the Smithsonian institution*, in charge of the United States national museum; W. de C. Ravenel, *administrative assistant.*

Scientific staff

Department of anthropology: W. H. Holmes, *head curator.*

1 Division of ethnology: O. T. Mason, *curator;* Walter Hough, *assistant curator;* J. W. Fewkes, *collaborator.*

2 Division of historic archeology: Paul Haupt, *honorary curator;* Cyrus Adler, *honorary assistant curator;* I. M. Casanowicz, *aid.*

3 Division of prehistoric archeology

4 Division of technology (mechanical phases): J. E. Watkins, *curator;* George C. Maynard, *aid.*

Section of electricity: G. C. Maynard, *custodian.*

5 Division of graphic arts:

Section of photography: T. W. Smillie, *custodian.*

6 Division of medicine: J. M. Flint, *honorary curator.*

7 Division of religions:

Section of historic religious ceremonials: Cyrus Adler, *custodian.*

8 Division of history and biography:

Section of American history: A. H. Clark, *custodian;* Paul Beckwith, *aid.*

Department of biology: Frederick W. True, *head curator.*

1 Division of mammals: Frederick W. True, *acting curator;* G. S. Miller jr, *assistant curator;* Marcus W. Lyon jr, *aid.*

2 Division of birds: Robert Ridgway, *curator;* Charles W. Richmond, *assistant curator;* J. H. Riley, *aid.*

Section of birds eggs: William L. Ralph, *honorary curator.*

3 Division of reptiles and batrachians: Leonhard Stejneger, *curator.*

4 Division of fishes: Tarleton H. Bean, *honorary curator;* Barton A. Bean, *assistant curator.*

5 Division of mollusks: William H. Dall, *honorary curator;* C. T. Simpson, Paul Bartsch, *aids.*

6 Division of insects: L. O. Howard, *honorary curator;* W. H. Ashmead, *assistant curator;* R. P. Currie, *aid.*

Section of Hymenoptera: W. H. Ashmead, in charge.

Section of Myriapoda: O. F. Cook, *custodian.*

Section of Diptera: D. W. Coquillett, *custodian.*

Section of Coleoptera: E. A. Schwarz, *custodian.*

Section of Lepidoptera: Harrison G. Dyar, *custodian.*

Section of Arachnida: Nathan Banks, *custodian.*

7 Division of marine invertebrates: Richard Rathbun, *honorary curator;* J. E. Benedict, *first assistant curator;* M. J. Rathbun, *second assistant curator;* Harriet Richardson, *collaborator.*

Section of helminthologic collections: C. W. Stiles, *custodian.*

8 Division of comparative anatomy: Frederick A. Lucas, *curator.*

9 Division of plants (national herbarium): Frederick V. Coville, *honorary curator;* J. N. Rose, C. L. Pollard, *assistant curators;* W. R. Maxon, *aid.*

Section of forestry: B. E. Fernow, *honorary curator.*

Section of cryptogamic collections: O. F. Cook, *honorary assistant curator.*

Section of algae: W. T. Swingle, *custodian.*

Section of lower fungi: D. G. Fairchild, *custodian.*

Associates in zoology (*honorary*): Theodore N. Gill, C. Hart Merriam, R. E. C. Sterns.

Department of geology: George P. Merrill, *head curator.*

1 Division of physical and chemical geology (systematic and applied): George P. Merrill, *curator;* W. H. Newhall, *aid.*

2 Division of mineralogy: F. W. Clarke, *honorary curator;* Wirt Tassin, *assistant curator;* L. T. Chamberlain, *honorary custodian of gems and precious stones.*

3 Division of stratigraphic paleontology: Charles D. Walcott, *honorary curator;* Charles Schuchert, *assistant curator.*

Section of vertebrate fossils: F. A. Lucas, *acting curator.*

Section of invertebrate fossils: Paleozoic, Charles Schuchert, *custodian;* Carboniferous, George H. Girty, *custodian;* Mesozoic, T. W. Stanton, *custodian;* Cenozoic, W. H. Dall, *associate curator.*

Section of paleobotany: Lester F. Ward, *associate curator;* A. C. Peale, *aid;* F. H. Knowlton, *custodian of Mesozoic plants;* David White, *custodian of Paleozoic plants.*

Administrative staff

Associate in paleontology (honorary): Charles A. White.

Administrative assistant, William deC. Ravenel; *superintendent* J. E. Watkins; *chief of correspondence and documents,* R. I. Geare; *photographer,* T. W. Smillie; *registrar,* S. C. Brown; *disbursing clerk,* W. W. Karr; *supervisor of construction,* J. S. Goldsmith; *property clerk,* W. A. Knowles (acting); *librarian,* Cyrus Adler; *assistant librarian,* N. P. Scudder; *editor,* Marcus Benjamin.

Paleontology. 376,721 specimens, including much material described in the various government geological surveys; 58,000 types and illustrated specimens; fossil plants from all horizons, invertebrates from the Cambrian, Ordovician, Carboniferous, Upper Cretaceous and Tertiary deposits.

Mineralogy. 29,527 specimens arranged in three general series; exhibition, study and duplicates. The exhibition series, intended for the public and the student, is arranged under the following heads: systematic series; comparative series; meteorite collection; gem collection.

The systematic series is divided into two general classes: native elements and compounds of the elements. The compounds of the elements are further divided and grouped under certain heads according to their more negative constituents, as follows:

Compounds of the halogens, fluorids, chlorids, bromids and iodids. Compounds of sulfur, selenium, tellurium, arsenic, and antimony, including sulfids, selenids and tellurids, arsenids, antimonids, sulfarsenids and sulfantimonids; also sulfosalts. Oxygen compounds, including oxids and the oxygen salts, borates, aluminates, chromites, ferrites, manganites, plumbates, arsenites and antimonites, selenites and tellurites, carbonates, silicates, titanates, columbates and tantalates, nitrates, vanadates, phosphates, arsenates and antimonates, sulfates, selenates and tellurates, chromates, molybdates and tungstates, iodates and uranates. Compounds of organic origin, including salts of organic acids and carbon compounds.

Each of these classes is further separated into groups according to their chemical relationships. Each group is preceded by a general group label stating the class to which it belongs, the group name, a list of the minerals composing that group, together with their chemical formulas, system of crystallization, and a short description of the occurrence, association, and characteristic form of each member of the group. Following the group label, arranged in order from left to right, are the several members of the group selected to illustrate, as completely as the conditions will permit, their occurrences, associations, color, habit, etc.

Each specimen is mounted on a standard block, in front of which is a small label giving the name, locality, etc. of the individual.

In the comparative series the properties of minerals are defined, illustrated and compared. In each case the label containing a definition of the property under consideration precedes a series of specimens and, wherever they can be used advantageously, a series of models illustrating that property.

The meteorite collection, including the Shepard and museum collections, now contains several hundred specimens representing 336 falls. As in the other series, the collections are preceded by introductory labels, on which are noted the more prominent physical and chemical characters of meteorites, together with the classification here adopted. The arrangement of the two collections is somewhat different, that of the museum being geographic, while the Shepard collection is chronologic.

The gem collection now compares favorably with any other public collection of this kind in the country, both in number and kinds of stones exhibited. It is specially rich in those gems and ornamental stones which occur in the United States.

The study series includes material appealing exclusively to the specialist and is the source from which new exhibition series may be built, or old ones strengthened. It contains all that material which has been the source of investigation, or may be made the subject of research; together with those specimens, illustrating the occurrence and associations of a mineral in any one locality, that are not needed in the exhibition series, or which are not unnecessary duplications of the material already on hand. It also contains all original or type material belonging to the department. This is brought together in a case of drawers reserved for that purpose, and all type or original specimens which are not needed to complete the exhibition series are placed here together with a copy or abstract of the original papers, and a bibliography of publication in which the work has appeared. Those types used in the exhibition series are here indicated by cards giving their exact position in the cases.

The duplicate series includes all material not needed for the exhibition or study series, and from it all exchanges, gifts, etc., are made up.

Historic and economic geology and lithology. Four distinct series of specimens: exhibition series, 23,097 specimens; study series, 28,911; microscopic slides, 4700; duplicate series, 77,863 of all kinds.

Zoology. 2,661,148 specimens: mammals 27,016, birds 115,059, birds eggs and nests 64,661, insects 994,236, reptiles and batrachians 38,977, fishes 151,301, marine invertebrates 509,331, mollusks 740,017, helminthologic collection (catalogue entries) 4945, comparative anatomy 15,585.

Many duplicates for exchange.

Botany. 391,241 specimens from all parts of the world. Many duplicates available for exchange.

Anthropology. 818,234 specimens.

The national museum makes exchanges in all departments, and also makes up extensive collections from the duplicate material, specially conchological and geologic, which are presented to educational institutions throughout the country.

FLORIDA

John B. Stetson university, De Land. John F. Forbes, *president.* Collections small, consisting of about 2500 specimens of geologic, mineralogic and zoologic material.

GEORGIA

Bowdon college, Bowdon. No report.

Emory college, Oxford. H. H. Stone, *curator.*

Paleontology. 200 specimens from the Silurian, Carboniferous, Cretaceous and Tertiary.

Mineralogy. 5000 specimens including Smithsonian collections and miscellaneous specimens from Georgia, Maryland, New York, Italy, Sicily and Africa.

Historic and economic geology and lithology. A few specimens.

Zoology. A very limited collection.

The museum is made up largely of Japanese, Chinese and Indian curios together with relics of Civil and Spanish American Wars.

Geological survey of Georgia (state museum), state capitol, Atlanta. W. S. Yeates, *state geologist and curator of the museum;* S. W. McCallie and Thomas L. Watson, *assistant geologists.* Mr McCallie is also assistant curator of the museum in charge of the biologic departments.

Mineralogy. 930 specimens arranged in systematic series.

Economic geology. 149 specimens of Georgia ores, clays, abrasives, etc.; 50 eight inch cubes of building stones including marble, granite, gneiss, hornblende, sandstone, serpentine and Caen stone, from various localities in the state, uniformly dressed to show susceptibility to various methods of finishing. A series of six slabs of marble, white, mottled, pink and gray, from the quarries of the Georgia marble co., at Tate; a pyramid of large lumps of pyrite from Lumpkin county; and a few large specimens of ores of gold, iron and manganese.

Zoology. Collections small.

Botany. 147 specimens of Georgia woods, cut and polished; 236 bottles containing specimens of fruit; an imperfect series of cotton from plant to spindle.

Material exhibited by Georgia at the Cotton states and international exposition, including besides that above mentioned, a relief map of that part of Georgia surveyed by the United States geological survey; 282 specimens of mineral waters; photographic transparencies of Georgia scenery; and 203 Indian relics.

Total, 3352 catalogued specimens.

Mercer university, Macon. J. F. Sellers, *professor of geology,* in charge. G. W. Macon, *professor of biology.*

Paleontology. Willett collection of about 1000 specimens of Mesozoic invertebrate fossils, chiefly Cretaceous; Tolafree collection of about 500 specimens of Paleozoic invertebrate fossils, chiefly Devonian; about 300 specimens of Paleozoic invertebrate fossils, chiefly Silurian; about 200 specimens of Mesozoic vertebrate fossils consisting of fish teeth and vertebrae from the Cretaceous of southwestern and middle Alabama; miscellaneous collection of about 500 invertebrate fossils, Paleozoic, Mesozoic and Tertiary. Total number of specimens 2500. This museum has for exchange about 250 invertebrate Cretaceous fossils.

Mineralogy. Mercer collection of about 1000 rocks, chiefly from United States; Shepard collection of about 1200 minerals from various localities; J. Lawrence Smith collection of about

500 minerals and rocks from various localities; Smithsonian collection of about 1000 minerals and rocks from various localities; Georgia collection of about 500 minerals and rocks from Georgia; miscellaneous collection of about 1000 minerals and rocks chiefly from Georgia. Total number of specimens about 5000. The museum has for exchange about 500 specimens of Georgia minerals and rocks.

Historic and economic geology and lithology. About 1000 specimens of Georgia iron, gold, graphite, asbestos, ochre and bauxite ores; building stones, kaolin, etc.

Zoology. Numerous vertebrate skeletons and parts; a few vertebrate embryos; 50 specimens of Amphioxus, fishes, snakes, turtles and lizards; about 200 specimens of invertebrates; about 100 microscope slides; about 200 specimens of birds eggs. Total number of specimens about 600.

Botany. About 200 dry specimens of gymnosperms and angiosperms; about 50 specimens of thallophyta; about 50 specimens of bryophyta and pteridophyta; a small collection of seeds and fruits; about 200 microscope slides. Total number of specimens 600.

Ethnology and anthropology. 500 specimens, consisting of Indian pottery, rough and polished stone, war utensils, etc.

A small collection of meteorites, consisting of the Stewart Co. (Ga.) stone, the Putnam Co. (Ga.) stone (both described in the *American journal of science*), and several smaller fragments obtained by collection and exchange.

University of Georgia, Athens. Small collections in geology and archeology.

IDAHO

University of Idaho, Moscow. J. M. Aldrich, *curator.*

Paleontology. 250 specimens.

Mineralogy. 1000 specimens.

Historic geology and lithology. Small collection.

Zoology. 40 specimens of mammals; 125 mounted specimens of birds; 80 specimens of fishes; 25 specimens batrachians and reptiles.

Entomology. 16,000 specimens, many unnamed, though about 2000 species have been determined by authorities of high standing.

Botany. More than 10,000 sheets of flowering plants; also collections of woods, tree fruits, fungi, etc.

Archeology. 100 specimens; also some arrowheads and minor articles.

ILLINOIS

Augustana college, Rock Island. J. A. Udden, *curator.* The museum is intended as an adjunct in instruction, but is also devoted to the care of local natural history material.

Palcontology. 4000 specimens: general collection; McMaster collection from Rock Island and vicinity.

Mineralogy. 500 specimens: general.

Historic and economic geology and lithology. 1000 specimens: rocks, 500; formational collection of rocks and some fossils, 300; collection illustrating dynamic geology, folds, mud cracks, concretions, etc., 200.

Zoology. 3000 specimens: 2000 general; egg collection, 100 species.

Botany. 3000 specimens: exsiccate phanerogams.

Ethnology and anthropology. 1000 specimens: 500 coins; Kaffir articles of ornament, etc.; Hindu workmanship; American Indian relics.

Austin college, Effingham. No report.

Carthage college, Carthage. No report.

Chicago academy of sciences, Lincoln park, Chicago. Thomas C. Chamberlin, *president;* William K. Higley, *secretary;* Frank C. Baker, *curator* in charge; Frank M. Woodruff, *taxidermist.*

Palcontology. 12,000 specimens representing 1600 species of fossils: specially rich in forms of Silurian and Carboniferous formations; nearly complete collection of Niagara fossils from Chicago region containing about 30 type specimens; a mounted skeleton of Elephas primigenius and a good specimen of a skull of Castoroides ohioensis. The Cincinnati

collection includes several type specimens of Miller's cephalopods (Endoceras).

The type specimens exhibited are: Endoceras egani, bristolense, and inaequabile; Eucalyptocrinus egani, rotundus, depressus, and turbinatus; Saccocrinus infelix, pyriformis, and urniformis; Glyptaster egani; Cyathocrinus vanhorni; Myelodactylus bridgeportensis; Cleidophorus chicagoensis; Holocystites jolietensis; and Strotocrinus bloomfieldensis, described by S. A. Miller; redescribed types: Saccocrinus marcouanus Winchell and Marcy; Cyathocrinus cora Hall; Ichthyocrinus corbis Winchell and Marcy, and Melocrinus obpyramidalis, Winchell and Marcy; Cyathocrinus turbinatus, Amperistocrinus dubius, Cyphocrinus chicagoensis and Rhycnosaccus americanus are all Weller's types. Many duplicates for exchange.

Mineralogy. 350 species and varieties and 3500 specimens of world-wide distribution, but particularly representing the United States. Quartz, calcite, gypsum, feldspar, copper carbonates, and the sulfids are the best represented groups. A few duplicates for exchange.

Historic geology. Collections illustrate all formations, but principally the Hudson river group, the Niagara of the Chicago region, the Burlington, the Mazon creek Carboniferous, and the Tertiary of the southeastern United States.

Lithology. 1000 specimens: illustrating the principal geologic periods, also all minerals useful to man; numerous original models of phenomena in dynamic geology. Some material for exchange.

Zoology. 100,000 specimens illustrating the fauna of the United States. Protozoa represented by colored figures; a small series of Porifera, Coelenterata, Echinodermata and Vermes; 4000 species and 75,000 specimens of Mollusca, including 150 species, 5000 specimens comprising a complete collection of the local

fauna, represented by specimens of all ages and varieties including several types; 6000 species, 20,000 specimens of North American Insecta besides good collections of Arachnida and Crustacea; a series of American Reptilia and Batrachia; a large collection of birds from North America, including a complete series of the avifauna of the Chicago region; a small series of North American mammals, including several from Alaska (moose, mountain sheep, etc.). Nearly every department contains some type specimens. Material for exchange.

Botany. 5000 specimens: a representative series of local and United States phanerogams and vascular cryptogams, and a large collection (700 species) of lichens. Limited number of flowering plants for exchange.

Ethnology. 1000 specimens: some excellent axes and arrow points of the American Indians from the Central states.

The arrangement of the academy's collections is consecutive, the sequence beginning with mineralogy and continuing through historic geology, zoology and ethnology from the lower to the higher types. A hand indicates the direction of the classification and four of these are placed in each case. Labels are printed in clear type and each case is furnished with explanatory labels giving notes of classes, orders, families, etc., and in addition pictures, maps and models are profusely used where they will in any way add to the understanding of the objects exhibited. A limited number of well selected specimens are exhibited for the public, mounted on heavy binders board tablets, covered with light-faced manila cardboard, which is not seriously affected by light. The study series, where the majority of the specimens are placed, is installed in drawers beneath the exhibition cases, each set in a dark-colored cardboard tray, the data being printed on a small label glued to the tray.

The exhibits of the museum are designed primarily for the instruction of the general public and for this reason each case is made as nearly encyclopedic as possible. The study series is prepared for the student and specialist and is installed with the strictest regard for scientific accuracy, but does not contain descriptive labels of any kind.

Chicago university, Walker museum, Chicago. Thomas C. Chamberlin, *professor of geology and director. Curators:* Rollin D. Salisbury, *professor of geographic geology;* Joseph P. Iddings, *professor of petrology;* Richard A. F. Penrose jr, *professor of economic geology;* Samuel W. Williston, *professor of paleontology;* Frederick Starr, *associate professor of anthropology;* Stuart Weller, *assistant professor of paleontologic geology;* William F. E. Gurley, *associate curator.*

Paleontology. 10,000 catalogued numbers, with 50,000 (estimated) not yet catalogued, 500,000 (estimated) specimens in all; including about 2000 type specimens representing about 1000 species. The most important collections are, the Gurley collection, the James collection, the Faber collection, the Sampson collection, the Washburn collection, the Van Horne collection and the Weller collection. The formations best represented are the Paleozoic of the Mississippi and Ohio valleys.

In vertebrate paleontology, there are nearly 500 catalogued specimens, with a smaller number yet uncatalogued, for the most part collected under the direction of the late Professor Baur, or obtained by purchase. The larger part of these are from the Permian of Texas and Illinois and the Laramie Cretaceous of Wyoming, with others from the White River Oligocene, the Kansas Niobrara Cretaceous and from Europe.

Duplicates for exchange from the Niagara group of Waldron Ind.

Mineralogy. 2000 specimens, best representing the commoner minerals and the tellurids and intended to illustrate chiefly the crystallographic development of minerals.

Economic mineralogy. 3000 specimens covering a wide range.

Lithology. 2500 specimens, embracing igneous, sedimentary and metamorphic rocks, but chiefly the former; and intended to illustrate the whole range of rocks.

Economic geology. A large series of ores and other mining products, representing the leading mining districts of the United States and of many foreign countries.

Geology. A systematic series of fossils arranged on a stratigraphic basis, illustrating the successive faunas and floras.

Zoology and botany. Extensive collections for class use only and therefore not considered as part of the museum.

Ethnology and archeology. 3000 specimens: exhibiting the archeology of several well marked archeologic districts of Mexico; illustrating the food supply, arts and industries of the cliff dwellers of Utah; collections from the Aleutian islands and from Japan, illustrating the ethnology of those regions; articles illustrating the ethnology of the Pueblo Indians of Mexico, and the Swiss lake dwellers; and several loan collections.

Total, 400,000 specimens.

College of liberal arts, Northwestern university, Evanston. U. S. Grant *curator;* A. R. Crook *mineralogy;* C. B. Atwell, *botany;* W. A. Locy *zoology;* and W. A. Phillips *anthropology.*

Paleontology. 3000 fossils from the Subcarboniferous of Illinois; a large number of specimens from the Coal Measures of Illinois; 300 specimens, including several types, from the Niagara group in the vicinity of Chicago; and 1000 specimens from the Cretaceous and Tertiary formations of Alabama.

Mineralogy. Some interesting material from the Lake Superior region; from Hot Springs Ark.; from the Yellowstone national park; and from the Black Hills of South Dakota. Much fine material was obtained from the World's Columbian exposition.

Mineralogy and lithology. 22,000 specimens: including a series of specimens from the typical localities of Europe; a set of rocks of Illinois; a set from the Black Hills of South Dakota; and a set from the Yellowstone national park; a set from the Lake Superior district and the U. S. geological survey educational series of rocks. Also a set of rocks from the copper bearing formation of Lake Superior and ore from the upper Mississippi lead and zinc district; these two sets are the property of the Wisconsin geological and natural history survey.

Zoology. 28,000 specimens: 3000 birds; 700 reptiles and batrachians; 900 fishes and 18,000 shells.

Botany. 20,000 specimens, including the college and Babcock herbariums, and various collections received from the World's Columbian exposition.

Ethnology. 8000 specimens exclusive of the local collection: relics of North American Indians; collections from southern Illinois, Missouri and Kentucky; complete series of specimens from England illustrating the process of making gunflints; and a large variety of material from various parts of the world. Much described material not on exhibition owing to lack of room.

The university medical school has a museum of comparative anatomy at Chicago.

Connected with the museum at Evanston is a "museum of ceramics and other arts".

Elgin scientific society, Elgin. Collections are small, the geologic material consisting principally of specimens gathered in the vicinity of Elgin, with a limited amount from Colorado, California and elsewhere.

The society has also a collection of shells and corals and some curios from Egypt and elsewhere.

Field Columbian museum, Chicago. F. J. V. Skiff, *director.*

Paleontology. 7000 specimens of fossils, with casts and models arranged chronologically to illustrate the animal and vegetable forms which have characterized the life of the globe at the succeeding stages of its history; exceptionally large and complete series of fossils of Niagara age from the Chicago region, of Mazon Creek Coal Measures plants, of European and American ammonites, of European ichthyosaurs, of American dinosaurs and of Bad Lands vertebrates; complete skeletons of the mastodon, Irish deer and extinct moa of New Zealand, and the largest known skull of Titanotherium and largest known limb bones of dinosaur.

Mineralogy. 6000 specimens. The arrangement is based on that given in Dana's new *System of mineralogy,* the purpose being to illustrate the different species therein described. Specimens worthy of special notice are: among the sulfids, large crystals of stibnite from Japan; among the haloids, the beautiful green and purple fluorites from English and American localities; among the oxids, the extensive collection of natural and ar-

tificially colored agates from South America; among the carbonates, curiously distorted calcite crystals from Egremont Eng. and the flos ferri aragonites; among the silicates, large crystals of Amazon stone from Pike's Peak, Col., and the transparent and perfect crystals of topaz from Siberia; among the phosphates, the richly colored vanadinites from Arizona; and among the sulfates, the brilliant groups of celestite from Sicily.

In addition to these the museum contains the Higinbotham collection of gems and gem minerals, one of the most valuable in the world. The Chalmers crystal collection contains about 200 specimens from the United States.

The collection of meteorites includes over 230 "falls" or "finds", represented by 5000 specimens having an aggregate weight of 4745.6 pounds, and 63 casts or models of notable meteorites. The specimens are divided into three classes, viz, siderites, siderolites and aerolites, and are arranged chronologically.

Structural and dynamic geology. 1500 specimens illustrating dendrites, volcanic products, cave products, varieties of rock structure, concretionary structure, and rock texture. A realistic reproduction of a limestone cave, in which about 100 specimens of stalactites and stalagmites are mounted in their natural position and with proper accessories, is an important feature of the exhibit.

Economic geology. 10,000 specimens, probably the largest and most complete of the kind in the world, illustrating modes of occurrence in nature of the minerals and ores of economic importance. Nearly all the important mining districts of the world are represented by typical specimens. Specially complete series are: mineral oils of the United States and their products, coals of the United States, platinum ores, zinc ores of the United States, marbles and clays. Ores of gold, silver, lead, copper, iron, zinc, mercury, nickel, and the rarer metals are also fully illustrated, many of the specimens being of great size and of a high degree of perfection. A full sized statistical column originally prepared by the United States geological survey, illus-

trates the quantity of different mineral products mined in the United States for each second of time during the year 1892. Numerous metallurgic processes are illustrated by specimens and charts.

Geographic geology. 50 relief maps with charts, globes and other geographic material illustrating topography, topography and geology, or topography and culture of various regions of the earth, and an accurate relief map 19 feet in diameter, of the surface of the moon.

Lithology. Two collections: one of rock specimens systematically arranged and one of polished and ornamental stone. The former includes about 1800 specimens of uniform size, 4 x 3 x 1 inches, representing the different kinds of rocks. The latter is made up of about 200 specimens of polished slabs of different sizes, intended to illustrate the different ornamental stones, chiefly marbles and granites.

Zoology. Representatives of all the important classes of animals, with few exceptions arranged in systematic order, beginning with the lowest forms and ending with the highest. The chief groups are: 1) Porifera from the Mediterranean and the West Indies. 2) Coelenterata, in wall cases about 8 feet high and with a total length of 130 feet, from all parts of the world, many of the Actinozoa being represented by glass models. 3) Echinodermata in table cases which have a glass surface of over 300 square feet. 4) A small collection of Annulata. 5) Arthropoda; the crustaceans filling a wall case 8 feet high and 50 feet in length, insects, 10,000 species, most of which are on exhibition, Coleoptera best represented, Lepidoptera coming next with 2000 specimens. 6) Mollusca, about 7000 species, most of which are mounted on tablets and displayed in table cases, presenting an exhibition surface of over 1200 square feet. The Nudibranchia are represented by glass models. The Brachiopoda are installed with the Mollusca. 7) Pisces are represented by 1600 species. A series representing the leading groups are exhibited by means of casts, mounted specimens and alcoholics. 8) Reptilia. About 300 species, some of which are mounted.

The rest are alcoholics. 9) Aves, chiefly the C. B. Cory collection made under Mr Cory's direction in southern United States and the West Indies, a collection from East Africa by the museum's East African expedition and a collection of North American bird skins. About 600 birds are mounted and a few mounted groups beautifully illustrate color protection and other characteristics. There is also a collection of North American and foreign birds eggs. 10) Mammalia comprises over 8000 specimens. A large series representing all orders is mounted and arranged in systematic order, beginning with the duckbill and ending with the chimpanzee. In addition there are 12 real and artistic groups of large mammals, three to eight animals in each, mounted by Mr C. E. Akeley, showing much of their natural history. The valuable osteologic collection consists of mounted skeletons of over 225 species of animals, including, with few exceptions, all the important orders of the Vertebrata, and arranged in systematic order, paralleling the mounted specimens.

Botany. Economic: collections of the foreign governments in forestry, as exhibited in the government and forestry buildings at the World's fair; the major part of the gums, oils, medicinal plants, tan barks, dyewoods, seeds and fibers exhibited by the foreign countries in the agricultural and manufacturers building; the economic plant exhibit of the United States government as displayed in the government building; and portions of many American exhibits in this important branch of natural science. Among the specimens exhibited is a very fine and costly decortication of a cork tree with three branches, considered to be the best example of dexterous bark peeling ever procured. Starting with the above material as a base, material that is unique in its completeness and museum character, other large series representing the source, utilization and character of a large number of vegetable products are being installed. These series begin with the source of each product and carry it through its processes to its completed form for utilization by man.

Systematic collections. The herbarium contains over 150,000 sheets of plants principally from North America, the West Indies and Europe; comprises the former private herbariums of Dr Arthur Schott, notable for its United States boundary survey and Isthmus of Darien survey plants, and his Yucatec and Hungarian series; that of Mr M. S. Bebb, notable for the largest representation of the genus Salix in this country; that of Mr Arthur A. Heller and of Mr Harry N. Patterson, notable for its complete representation of the plants of Gray's manual and its full sets of Curtiss, Pringle, Cusick, Chapman, Hall & Harbour, the Gaumer Yucatan plants; the plants of the Allison V. Armour expeditions, etc.; a large number of classic series of the plants of North America, South America, the West Indies and Central America.

Anthropology. Collections are intended mainly to illustrate the more primitive or uncivilized phases of the development of the human race. There are two divisions of the subject, and the collections illustrating them are separately installed. The first division consists of apparatus used in studying the greatly varied physical and psychic phenomena. The second comprises exhibits of the handiwork of man and of collections of crania, casts and other objects, articles and materials illustrating the physical characteristics of the race. The works of prehistoric peoples are brought together in groups according to locality from which they are derived, people, time, or stage of progress they are thought to represent, or, otherwise, with reference to some other special subject to be illustrated. Those of living or historic peoples are assembled according to the tribe or nation to which they pertain.

The physical and psychic anthropologic collection consists of various kinds of apparatus obtained and set in place by Dr Joseph Jastrow, the Boas collection of skulls, trephined skulls from Peru, Papuan skulls, etc.

Ethnology. The more notable collections are: Stanley McCormick Hopi material; Edward E. Ayer collection of North American material; Hassler collection of feather work, and other

ethnologic specimens from the Indians of Paraguay; Bruce collection from Alaska; Welles collection from Venezuela; Quelch collection from British Guiana; Finch collection from New Guinea; Peace collection from New Caledonia; Remenyi collection from South Africa; Pegosky collection from Siberia, and the H. N. Higinbotham collection from Korea.

Archeology. The more notable collections are: Montes and Dorsey Peruvian collection: United States Columbian collection of objects of gold, earthenware and stone; Harris collection of Peruvian antiquities; Riggs collection from the Southern states; Johnson collection of reproduction of Irish antiquities; Allison V. Armour collection of Mexican antiquities; original and reproduction of ancient Italian bronzes; Cyrus H. McCormick collection of Chilian antiquities; Green cliff house collection; Charnay casts from Central America; and Wyman collection of copper implements and relics of stone, and models of Pueblo villages and ancient ruins, with numerous ancient relics and modern utensils from the Pueblo region; also large series of implements, objects and models illustrating the arts of quarrying and mining and the manufacture of stone implements by the aborigines.

Greer college, Hoopeston. No report.

Hedding college, Abingdon. No report.

Illinois state museum of natural history and geological survey of Illinois, Springfield. C. H. Crantz, *curator and state geologist.* The collections constitute the Illinois state museum of natural history.

Paleontology. 5000 species of fossils collected during the geological survey of the state by Prof. A. H. Worthen.

Mineralogy and geology. 2500 specimens from the state.

Zoology. Mammals, birds, nests and eggs, reptiles, fishes and insects.

Illinois Wesleyan university, Powell museum, Bloomington. J. Culver Hartzell, *curator.*

The Powell museum was named in honor of Maj. J. W. Powell, who was the instructor of natural science in the Illinois Wes-

leyan from 1865 to 1868. Maj. Powell made his early Rocky mountain explorations from the Wesleyan, and the museum, which was established in 1852 with 1700 specimens, contains collections made during these trips. There are now about 40,000 labeled specimens accessible to visitors and about 100,000, also labeled, arranged in trays and cases specially for students. The rest of the material is not catalogued and the amount not known. The material has been received from various sources: the Wheeler, Powell, Canadian and state surveys, the United States geological survey, the United States national museum, the Smithsonian institution, private collections and exchanges.

Paleontology. Nearly all formations of North America are represented by exceptionally fine vertebrate and invertebrate fossils, specially the latter; an extensive collection of Illinois fossils; 10 casts of extinct vertebrates; fossil plants from the Silurian, Carboniferous and Cretaceous, particularly the latter two; a large number of well preserved fossil insects from Colorado and Wyoming.

Mineralogy. Nearly all the species and varieties of Dana are represented; a good collection of crystals.

Geology. Series of rocks representing nearly all formations of Europe and North America, and the lithologic characters of the various groups; a large collection of geologic maps; an extended series of photographs of western geologic scenery; a good collection of ores from the western states.

Zoology. 10,000 species of shells from various parts of the world; 1000 species of insects from Europe and America; 600 species of birds mostly from America; 100 clutches of eggs; 200 mammals; 60 skulls of mammals from North America, South America and Australia; a series of human skulls, modern, cliff dwellers and mound builders; several hundred alcoholic specimens.

Botany. 1000 species of marine algae from various parts of the world; 600 species of ferns from North America, Hawaiian islands, India, China, Japan, Australia, New Zealand, South

America and Europe; 500 mosses and lichens from North America and Europe; 6000 species of phanerogams from North and South America, Europe and Australia; a nearly complete collection of North American woods.

Ethnology. A large collection of Zuñi and Moqui utensils, pottery, articles of dress, etc.; a number of vases, masks, sculptured heads etc. from Mexico; utensils of the cliff dwellers and mound builders; a recently acquired collection of 1140 specimens of tablets, pipes, mills, celts, knives, saws, discoids, mortars, etc.; old coins; articles of dress; relics from battlefields, etc.

Knox college, Galesburg. Albert Hurd in charge.

Palæontology. 2100 specimens: a general collection of fossils illustrating all formations, specially the Carboniferous; no type specimens.

Mineralogy. 1250 specimens: general collection illustrating fairly well the common minerals.

Zoology. 17,000 specimens: 400 species of birds; 2500 species of shells, marine, fresh-water and terrestrial; 2000 species of insects, etc. The specimens in nearly all classes and orders are selected mainly for general illustration in zoology.

Botany. 20,000 specimens, 9000 species, including the "Mead herbarium" of Dr S. B. Mead, Augusta Ill., nearly one half of which are foreign. 2100 species, 8000 specimens from the "Mead herbarium," representing a large number of families, for exchange.

Ethnology and anthropology. 100 specimens: 50 Neolithic implements from Denmark, and a few others.

Lake Forest university museum, Lake Forest.

Small collections.

Geology. A good set of the Guelph group of Niagara fossils from the vicinity of Port Byron Ill.; a collection of the Mazon creek (Ill.) ferns; and several smaller ones from various parts of the state.

Lincoln college of the James Millikin university, Lincoln. C. S. Oglevee, *professor of biology*, in charge.

Collections small and not properly classified and catalogued.

Northwestern college, Naperville. L. M. Umbach, *professor of natural sciences*, in charge.

Paleontology. 300 specimens: including Silurian species from Illinois, Iowa and Indiana; many Devonian Mollusca, etc., from Ohio; and good collection of Carboniferous plants from Mazon creek, Grundy co. Ill.

Mineralogy, economic and historic geology, and lithology. The combined collections aggregate about 600 specimens, including rocks from the glacial drift of this region; a series of agatized woods from Colorado; lithologic material from Massachusetts and Connecticut; and an economic collection illustrating the mining regions of northern Wisconsin and Michigan.

Zoology. A small series of local mammals, birds, reptiles, and fishes—about 150 specimens in all.

Botany. 17,000 specimens illustrating about 5000 species of plants: a fair representation of the flora of North America; quite complete herbarium of plants from the vicinity of Chicago; about 350 Yucatan species and a small herbarium of European species.

Exchange list includes 2000 specimens of about 1200 different species.

Ethnology. 350 specimens, including several skeletons, articles of wearing apparel, stone implements, etc.

Taylor museum, Blackburn university, Carlinville. J. D. Conley in charge; Charles Robertson, *assistant.*

Paleontology. 12,000 specimens: representing nearly every epoch throughout the Paleozoic and Mesozoic eras; a large part of the Van Cleve corals figured in the Indiana report; richer in drift corals than anything else but with an equal number of Silurian, Devonian and Carboniferous fossils; a large number of duplicates of the above fossils but comparatively few species in the Jurassic, Cretaceous and Tertiary.

Mineralogy. 5000 specimens: copper and iron ores; volcanic products.

Historic and economic geology and lithology. One of the largest collections in the state consisting of 75 cases averaging 4x5 feet wall space; specimens labeled but not catalogued.

Zoology. A small collection.

Botany. A small collection.

Ethnology and anthropology. 500 specimens: Indian axes; spear and arrowheads; pottery, pestles and ceremonial implements.

University of Illinois, Champaign. The professors of the several departments are in charge of their respective departments of the museum, there being no regular museum curators. C. W. Rolfe, *professor of geology.*

Paleontology. 49,000 specimens: private collection of Prof. A. H. Worthen, ex-state geologist; duplicates from the state museum, of the collection made by the Worthen survey of the state; private collection of the Rev. H. Herzer, of Ohio; private collection of Mr Tyler McWhorter; Ward's series of casts of fossils; special collections obtained by purchase and exchange; and 742 type specimens from the geologic survey of Illinois. The collections are particularly rich in Paleozoic material.

Mineralogy. 12,000 specimens, arranged solely for purposes of class study, no attempt being made to collect showy specimens on account of the limited means available, and 575 crystal models. It includes all but the rarest species.

Historic and economic geology and lithology. 5500 specimens and 1000 thin sections obtained by purchase and illustrating nearly all formations. The economic collection includes a good series of ores, building and ornamental stones, soils and other economic materials.

Zoology. 11,000 specimens, illustrating chiefly the mammals, birds (with nests and eggs), reptiles, fishes and casts of fishes and mollusks. The Bolter collection of insects contains over 16,000 species represented by about 120,000 specimens. The lower invertebrates are represented in part by a large series of Blaschka glass models. The extensive collections of the Illinois state laboratory of natural history are also available to the university students. No duplicates for exchange.

Botany. 40,000 specimens: students reference herbarium, confined to the flora of this, Champaign, county; experiment station herbarium, consisting chiefly of weeds, specimens illustrating diseases of cultivated plants, cultivated plants, and plant seeds; a museum collection of the woods of Illinois; and the university herbarium, which makes a specialty of the flora of Illinois. The collections are specially rich in certain groups of fungi and in the exsiccati of fungi. Duplicate specimens for exchange.

Ethnology and anthropology. 800 specimens: including arrow points, spearheads, etc., mostly from the bluffs of the Mississippi river in Calhoun county, Ill., and vicinity, Indian tools and household utensils, casts of skulls and brains, and models of the cliff dwellings of the southwest. No duplicates for exchange.

Wheaton college, Wheaton. No report.

INDIANA

Franklin college, Gorby collection, Franklin. D. A. Owen in charge.

Paleontology. 35,000 specimens best representing formations of the Silurian, Devonian and Carboniferous systems, the specimens consisting of corals, crinoids, brachiopods, lamellibranchs, gastropods, cephalopods, trilobites and a few vertebrates.

Mineralogy. About 1000 specimens collected in various parts of the United States, with some from other countries.

Zoology. 200 specimens of birds, and 750 birds eggs; 500 mollusks.

Ethnology. 300 specimens of arrowheads, axes, and other relics of the American Indians and 300 specimens of the cliff dwellers.

Hanover college museum, Hanover. Glenn Culbertson, *professor of geology.*

Geology. A working collection of 500 specimens, many of which are excellent of their kind, obtained to a great extent from the formations near Hanover and including a good series of fossils from the Hudson river group; many from the Clinton group; a large collection of Niagara, Corniferous and other Devonian

fossils; a few from the Carboniferous system; a number of Jurassic and Cretaceous and some bones and teeth of Mastodon and Elephas.

Indiana university museum, Bloomington. C. H. Eigenmann, *professor of zoology* in charge; V. F. Masters, *professor of geology;* D. M. Mottier, *professor of botany.*

Paleontology. 10,000 specimens: very complete collection of corals from Falls of the Ohio; fair collection of Brachiopoda; many thousand fossils of the Cincinnati group; numerous specimens of all the species of the Spergen hill fauna; nearly complete representation of the Waldron fauna; small series from the Genesee, Hamilton and Portage of New York; small series from the New York Trenton.

Cincinnati, Waldron and Spergen hill species for exchange.

Mineralogy. 250 species: ores and rock-making minerals constituting a working collection for students.

Historic and economic geology and lithology. Series of rocks illustrating the geologic formations of the United States; series (United States geological survey) illustrating the lithologic types.

Zoology. 55,000 specimens: several thousand species of fishes; several hundred birds; limited number of mammals, reptiles and batrachians; miscellaneous collection of invertebrates.

Botany. A small but constantly increasing collection of dry and alcoholic specimens of the higher and lower forms of plant life illustrating certain phases.

Purdue university, Lafayette. Stanley Coulter, *director of the biologic laboratories.*

Paleontology. 4000 specimens, confined almost exclusively to the forms found in the Indiana series of rocks. While there are no type specimens, the collections are fairly complete in Silurian, Devonian and Carboniferous forms.

Mineralogy. A representative series of 1000 specimens of general interest. No duplicates for exchange.

Economic geology and lithology. Material is included in other collections, or distributed in the testing laboratories. No duplicates for exchange.

Zoology. 13,000 specimens: an almost complete series of mammals and birds of Indiana, numbering 500 specimens; the A. W. Butler collection of the lower vertebrates of Indiana, giving full suites of the serpents, lizards and batrachians; 500 fishes, representative of the larger genera and families; the Scheuch collection of Coleoptera, 6000 specimens; and the Scheuch and other collections of mollusks, 6000. No material for exchange.

Botany. 8000 specimens: 5000 phanerogams; 2000 cryptogams, etc.; 500 specimens of seeds and economic products; 60 of wood, and 500 microscopic sections. No material for exchange.

Ethnology. 1000 specimens: small collections of relics from Fort Ouiatenon and from the Pueblo Indian villages; also collection of local stone implements. No exchange.

The museum is organized for illustrative purposes in the various branches of science, and other features are subordinate to this.

Taylor university, Walker museum, Upland. O. W. Brackney, *curator.*

Paleontology. 500 specimens.

Mineralogy. 1000 specimens: iron ores best represented.

Zoology. 100 specimens: mounted birds and animals.

Botany. Mounted plants and specimens of wood found in this vicinity.

Ethnology and anthropology. 300 specimens: Indian relics, etc.

Museum also possesses a collection of coins and stamps.

Wabash college, Hovey museum, Crawfordsville. Mason B. Thomas, *curator;* Donaldson Bodine, *professor of geology and zoology.*

Paleontology. 4300 specimens: 300 casts of fossil vertebrates; 300 fossils from the Coal Measures; 500 crinoids, 200 trilobites and 3000 corals, brachiopods, gastropods, cephalopods, etc. from the Keokuk group at Crawfordsville; fossil fishes from Persia; and a series of mammalian fossils from California.

The illustrative material is valuable and fairly representative. The series of fossils is carefully arranged to portray the development of life from the early primordial times to the present.

Some groups of Devonian and sub-Carboniferous forms are well represented, and have furnished types for various species of crinoids, etc., for which the beds in the near vicinity are famous.

Mineralogy. 4000 specimens, and fairly representative, being specially rich in ores and rare species, and including an extensive study collection.

The economic collection includes 400 specimens: a valuable series of marbles and granites, and a series of iron ores with their furnace products, slags, etc.

Zoology. 10,575 specimens: birds 100, reptiles and amphibians 225, fishes 500, crustaceans 100, mollusks 9000, corals 300, sponges and echinoderms 300.

The collection of shells arranged and classified for systematic work, offers unusual facilities for students and includes many very rare species.

Zoological materials are arranged systematically to illustrate the development of the animal kingdom. The series of invertebrates is very complete, and the vertebrates include many articulated skeletons, and dissected specimens illustrating important anatomic structures.

Botany. A herbarium specially complete in North American species, and containing much material from European, Asiatic and South American countries, of 30,000 phanerogams, and 1500 cryptogams, and a series of 1000 specimens of economic products.

Material used to illustrate lectures in general botany greatly increases the value of these collections. Some parasitic fungi for exchange.

Ethnology. 6000 specimens: relics of the American Indians and the Mound Builders, including arrowheads, weapons, pipes, plummets, drills, ornaments, pottery, fabrics and skulls. Duplicates for exchange.

INDIAN TERRITORY

Indian university, Bacone. J. H. Scott, *president.*

Geology. Collections small and of general distribution, including fossils from the New York and Indian territory formations;

some miscellaneous material; a collection of minerals, including ores, calcites, agates and petrifactions.

There is a small collection of fresh-water shells.

IOWA

Amity college museum, College Springs. George M. Reed, *curator* in charge.

Paleontology. 2000 specimens: 1000 mollusks; 50 crinoids; 50 petrified fragments of bones of mountain lions and bears; 50 fragments of fossil lepidodendrons and ferns of Carboniferous age; and 10 belemnites from the Black Hills of Dakota. 200 duplicate mollusks for exchange.

Mineralogy. 1000 specimens of a general nature representing ores of gold, silver, lead, zinc, particularly iron and copper; a good collection of anthracite and bituminous coals from various localities; collections of sedimentary and crystalline rocks.

Zoology. 500 specimens: 200 alcoholic specimens of marine invertebrates; 200 shells; and 50 miscellaneous land specimens.

Botany. 100 specimens of dried plants, seeds and abnormal growths; a series of cotton plants in various stages of growth.

Ethnology. 200 relics of the American Indians; a "prehistoric whetstone" from Kentucky; a few archeologic specimens from the island of Cyprus.

Cornell college, Mount Vernon. No report.

Davenport academy of sciences, Davenport. Mrs Mary L. D. Putnam, *president;* J. H. Paarmann, *curator.*

The academy possesses extensive collections in archeology, ethnology, mineralogy, paleontology, entomology, birds and corals, besides a very large scientific library.

Iowa college, Parker museum of natural history, Grinnell. Director H. W. Norris, *professor of biology and geology* in charge.

Paleontology. 2000 specimens, chiefly from the Silurian and Devonian systems but not at present well arranged.

Mineralogy. A general collection of about 1000 specimens. Duplicates for exchange.

Lithology. Material not abundant.

Zoology. 2000 to 3000 specimens representing all classes of the animal kingdom. Illustrative, rather than comprehensive, with a separate collection of mollusks.

Botany. 2000 mounted specimens of phanerogams and 500 unmounted, and 500 to 1000 cryptogams, illustrating North American and European (chiefly Alpine) forms; small collections from Australia and from St Thomas, West Indies. A large number of European species for exchange.

Ethnology. Collections small.

Muscatine academy of science, Muscatine. R. W. Leverich, *president.*

The academy formerly possessed a valuable geologic collection and library which was totally destroyed by fire in 1896. Collections are being renewed, and now include a few fossils from the Devonian and Carboniferous systems, and from local formations; minerals and ores from Colorado, Arizona and Mexico; about 250 specimens in all. A large number of government publications have been received.

State university of Iowa, Iowa City. C. C. Nutting, *professor of zoology* in charge, assisted by H. F. Wickham, *assistant professor of zoology*, Rudolph Anderson, *taxidermist* and W. B. Bell, *scholar in zoology.*

Paleontology and geology. 30,000 specimens: Iowa fossils and other geologic material.

Zoology. 100,000 specimens, named in order of comparative size and excellence, illustrating the following classes: mammals, birds, reptiles and batrachians, marine invertebrates, insects, fishes. Much duplicate material for exchange, particularly birds and marine invertebrates.

Botany. 175,000 specimens. The herbarium, wholly distinct from the museum, is in charge of Thomas H. Macbride, *professor of botany*, and B. Schimick, *curator of the herbarium and assistant professor of botany.*

The collections of spermophyta, pteridophyta, and fungi are most valuable and the largest in number. Myxomycetes, algae and bryophyta are also extensively represented. Considerable material for exchange.

Ethnology. 800 specimens: a valuable collection of skulls, ivory carving and implements from the Eskimo and Indian tribes of arctic America; pottery and utensils from Mexico, Arizona and New Mexico; and a small collection of skulls and pottery of the mound builders, from Missouri and Iowa.

Upper Iowa university, Fayette. Bruce Fink in charge.

Palcontology. 1000 specimens: Silurian and Devonian fossils of Iowa; Cretaceous fossils of Kansas; Carboniferous fossils of Pennsylvania; also a small geologic collection from Germany. Some local forms for exchange, specially Atrypa reticularis, and Terebratula iowensis.

Mineralogy. 500 minerals from American localities.

Phenomenal geology. 100 specimens: ripple marks, stalactites, geodes, concretions, peat, etc.

Zoology. 600 specimens: 25 mammals, 25 birds, 200 reptiles and fishes, 100 insects, and 200 marine invertebrates.

Botany. A herbarium of 12,000 specimens. Three fourths of the herbarium are forms lower than Anthophytae, lichens being the best represented group. An immense variety of lichens for exchange.

Ethnology. 125 paleolithic implements and relics of the American Indians.

Wartburg teachers seminary and academy, Waverly. The Rev. Frederick Lutz, *president* in charge.

Palcontology. 938 specimens: chiefly from formations of the Silurian and Devonian systems.

Mineralogy. 1434 specimens.

Historic and economic geology and lithology. 352 specimens.

Zoology. 1128 specimens illustrating every division of the animal kingdom, specially birds.

Botany. 1151 specimens: a general herbarium, and a collection of woods.

Ethnology. 452 specimens. There is an art collection connected with the museum.

Western college, Toledo. No report.

KANSAS

Baker university museum, Baldwin. C. S. Parmeter in charge, assisted by J. C. Bridwell.

Paleontology. 21,156 specimens. Several hundred duplicates for exchange.

Mineralogy. 4810 specimens. 2000 duplicates for exchange.

Historic geology and lithology. 500 specimens. 200 duplicates for exchange.

Zoology. 43,638 specimens: mammals, 60; birds, 406; eggs, 1052; reptiles, 264; insects, 32,798; mollusks, 8458; marine invertebrates, 600. 5000 duplicates for exchange.

Botany. 7789 specimens: Phanerogamia, Hepatica and Musci. 500 duplicates for exchange.

Ethnology. 900 specimens. 300 duplicates for exchange.

Bethany college, Lindsborg. J. E. Welin, *curator* in charge.

Paleontology. 500 specimens: Silurian, Devonian, Carboniferous, Jura-Trias, Cretaceous, Tertiary and Quaternary; the type specimen (a skull in good condition) of M e g a l o n y x l e i d y i Lindahl. Some common fossils for exchange.

Mineralogy. 800 specimens from United States, Sweden, Africa and South America; contains specimens of almost all the mineralogic groups and serves the purpose of class elucidation.

Historic and economic geology and lithology. 100 specimens: different groups of rocks.

Zoology. 1000 specimens: mounted specimens of mammals and birds; unmounted skins of same and mammals for class study; alcoholic specimens of reptiles and all groups of marine and fresh-water invertebrates.

Botany. 1500 specimens: almost every family of flowering plants; several genera of ferns; a few mosses.

Ethnology and anthropology. 2000 specimens: a finely mounted and classified collection of Indian relics from this vicinity consisting of pottery; flint and bone implements; stone (Sioux quartzite) hammers, metates with hand pestles, some pipes and pipestone. The college has recently received a fine collection

of pottery, stone implements, doorplates, baskets, and two skulls from the cliff dwellings of New Mexico. In connection with this, there has been received a very fine collection of modern Indian pottery, stone implements, and other things of interest from the Pueblo and Apache Indians. Material for exchange.

The museum also possesses a fine collection of coins, paper money and postage stamps from every known country of the globe. It is probably the best of its kind in the state consisting of 3000 pieces of money, tokens and souvenirs.

College of Emporia, Emporia. George S. Fisher, *professor of natural science.* Collections are merely those made by students for illustration in the elementary courses.

Mineralogy. 300 specimens.

Historic geology and lithology. 200 specimens.

Zoology. 250 specimens of fishes received from the Smithsonian institution, and an equal number of insects.

Botany. 250 specimens representing local flora.

Kansas state agricultural college, Manhattan. E. A. Popenoe, *professor of entomology and zoology* in charge; G. A. Dean, *assistant in entomology;* Theodore H. Scheffer, *assistant in zoology.*

General geology. 3000 specimens: a series of common rock-forming minerals; common types of rocks; common fossils, placed with a view of affording students of the science, as given in our course, a fundamental knowledge of the subject.

Permo-Carboniferous and Cretaceous fossils for exchange. Also specimens of rocks of the vicinity.

Zoology. 8000 specimens illustrating collections in the various branches. The local reptilian fauna and mollusca are fairly well represented.

Entomology. Very complete collection of insects consisting of from 10,000 to 20,000 specimens.

Kansas Wesleyan university, Salina. Alfred W. Jones, *professor of geology and entomology,* curator.

Paleontology. 900 specimens: fossil leaves representing the Dakota group; invertebrate fossils of the Upper Carboniferous

and the Lower Cretaceous formations. These form the greater part of the paleontologic collections. A few specimens from the two latter formations for exchange.

Mineralogy. 1200 specimens general in nature, no groups being particularly prominent. A limited amount of material for exchange.

Economic and historic geology. 500 specimens.

Zoology. 7000 specimens: the A. W. Jones collection of about 5000 specimens of Coleoptera, and about 1000 insects of other orders; 50 alcoholic examples of reptiles and batrachians; 100 mounted birds and mammals and half a dozen skeletons; and several hundred marine invertebrates. Duplicate specimens of Coleoptera for exchange.

Botany. 200 native plants. A few duplicates for exchange.

Ethnology. 300 specimens: series of casts of prehistoric implements from the Smithsonian institution; several native Indian implements and trinkets; and a few relics of the mound builders.

Midland college museum, Atchison. E. B. Knerr, *professor of natural sciences and mathematics*, in charge.

Paleontology. 800 specimens: local invertebrate fossils; the Miocene invertebrates of Virginia; fossil leaves from the Dakota group of the Cretaceous in Kansas, and other specimens of the fossil fauna of Kansas.

Mineralogy. 500 specimens illustrating the common minerals, mostly obtained by purchase.

Zoology. 120 specimens: local birds and snakes; a few mounted skeletons.

Botany. 1000 specimens: most of the flowering plants and ferns of Ohio, Iowa and Kansas; a collection of liverworts from Prof. Underwood.

Ethnology. A few relics of the American Indian.

University of Kansas, Lawrence. F. H. Snow, *director;* L. L. Dyche, *curator of zoology;* S. W. Williston, *curator of paleontology;* E. Haworth, *curator of mineralogy;* W. C. Stevens, *curator of the herbarium;* S. J. Hunter, *reptiles and invertebrates;* F. H. Snow, *curator of entomology;* C. E. McClung, *curator of microscopic collections.*

Palcontology. 40,000 specimens. They have been built up by purchase and exchange, but chiefly by the personal collections of the director and the curators in summer expeditions to western Kansas, Dakota, Wyoming and Colorado. They are specially rich in Cretaceous flora and fauna, the Dakota leaves, of which there are many type specimens by Lesquereux; and the Niobrara vertebrates, specially reptiles, among which are the types described by Dr Williston. There are also many Loup Fork mammals from Kansas, White river mammals from Dakota and Wyoming, and Jurassic reptiles from Wyoming. Also extensive series of Carboniferous and Permian leaves and insects, many Lower Cretaceous and Tertiary leaves, Permian and Carboniferous vertebrates, and several mounted Pleistocene mammals. It is one of the largest university collections in the United States. Duplicates for exchange.

Mineralogy. 12,000 specimens. The chief collection is that purchased from J. W. Cooper for $3000, consisting chiefly of specimens from the Rocky mountains. Duplicates for exchange.

Economic geology. 2000 specimens: illustrating the resources of Kansas for producing salt, gypsum, coal, building stone, lead, and zinc. Duplicates for exchange.

Zoology. This is one of the largest university collections in the United States, including North American mammals and birds, both skins and skeletons—mounted and unmounted; a collection of birds nests and eggs; a series of alcoholic specimens of reptiles; a series of marine and fresh-water shells.

Entomology. 200,000 specimens. The second largest of North American species in the United States, including 8000 species of North American coleoptera, 3500 North American Lepidoptera, 4000 Diptera, 3000 Hymenoptera and 1500 species of other orders. This collection contains many type specimens of Grote, Williston, Townsend and others. Duplicates for exchange.

Botany. 7000 mounted, and 15,000 unmounted specimens of North American plants. Duplicate material for exchange.

Ethnology. 500 specimens of mound builders implements.

Washburn college museum, Topeka. G. P. Grimsley, *professor of geology and natural history*, in charge.

Paleontology. 8000 specimens: Dakota fossil leaves from Kansas; a series of Cretaceous fossils; a series of fossils from the Carboniferous formations of Kansas; specimens of the Carboniferous flora of Ohio; and of the Lower Silurian and Devonian from the latter state.

Fossils from the Carboniferous of Kansas and from the Silurian and Devonian systems of Ohio for exchange.

Mineralogy. 500 specimens: ores and minerals of Kansas.

Historic geology and lithology. 500 specimens illustrative of the geology of Kansas.

Zoology. 2000 specimens: reptiles, fish and fresh-water shells of Kansas; mounted specimens of the buffalo, mountain lion, and smaller mammals; marine shells, corals and crustaceans.

Fresh-water shells of Kansas for exchange.

Botany. 2000 specimens: including a herbarium of the phanerogams, mosses and fungi of Kansas, and the Ellis collection of fungi. Kansas phanerogams for exchange.

This museum is very desirous of exchanging for geologic and zoologic material.

KENTUCKY

Bethel college, Russellville. No report.

Center college of Kentucky. No report.

Central university of Kentucky, Richmond. No report.

Kentucky university, Lexington. Alfred Fairhurst in charge.

Paleontology. 500 specimens of fossils, of general distribution. Faunas of the Trenton and the Corniferous limestones being best represented.

Mineralogy. 500 specimens: ordinary minerals, ores and nonmetallic minerals about equally represented.

Lithology. 200 specimens of rocks, including one of the students collections distributed by the Smithsonian institution.

Zoology. 75 specimens of small mammals; 1000 specimens of birds, of which 700 are mounted; about 100 specimens of birds

eggs and a few nests; considerable material from Mexico, South America, the West Indies and Australia; a few European forms; 200 specimens of reptiles, amphibians, fishes and invertebrates in alcohol; about 50 specimens of corals and 200 species of shells.

Ethnology. 100 specimens of images, articles of domestic use, etc., from Japan and an equal number from other parts of the world; about 700 specimens of stone implements of the North American Indians.

Zoology. Smithsonian school collections.

Louisville public library. A. S. Brandeis, *chairman of the committee on cabinets and art*, in charge.

Paleontology. 1000 specimens: not yet well arranged for exhibition.

Mineralogy. 6000 specimens: the Troost collection, and the J. Lawrence Smith collection, in part, which are noted for their fulness and extent rather than for excellence in any particular groups; large and valuable collection of precious and semiprecious stones; also important series of meteorites, native metals and crystals.

Economic and historic geology and lithology. 500 specimens: the Shreve memorial cabinet, containing many rare and beautiful marbles and other ornamental stones.

Zoology. The C. W. Beckham collection of nearly 3000 carefully prepared bird skins, almost entirely American species, chiefly from the southern states; birds eggs; a few fishes and bones of fish; several hundred rare shells; a collection of starfish and a good collection of corals.

Botany. Several thousand specimens: the Williamson collection of ferns; the Beckham collection of ferns and flowers; the Mrs Belknap collection of ferns, etc.; and the Octavia Allan Shreve collection of ferns and algae.

Ethnology. 500 specimens representing all parts of the world, and many periods of time.

Ogden college, Bowling Green. Malcolm H. Crump, *professor of natural science*, director. The museum is for practical purposes only, being limited to the needs of the students.

Paleontology. 2000 specimens: working collection of typical Kentucky fossils from the Chazy to the Quaternary. Specimens of Pentremites godoni, Lithostrotion canadense, Athyris, Productus, and many sub-Carboniferous fossils for exchange.

Mineralogy. 2000 specimens: typical North Carolina specimens for working purposes, including coal, ores, clays, etc. Some specimens of calcite and limonite for exchange.

Historic and economic geology and lithology. 200 specimens: iron ores, building stone, etc. Stratified and oolitic limestone for exchange.

State geological department, Lexington, Charles J. Norwood, *curator.*

Paleontology. General systematic collection to represent Kentucky geology.

Mineralogy. General collection.

Economic geology. Collections of building stones, dressed and polished and in the rough; ores of iron, lead and zinc; clays and clay products; coals and coke constitute the main exhibited material. There are also collections of barite, fluor spar, marls, paints, salt, petroleum, etc.

Zoology. General collection including the celebrated race horse Hanover, mounted.

Botany. Principally economic. A large collection of Kentucky woods in the shape of boards, partly dressed and polished.

There are also 200 large transparencies showing farming lands, cattle and stock, timber, quarries, etc.

A number of large colored photographs, geologic and other maps and two relief maps of the state, one geologically colored, the other to show the distribution of timber. The collections are intended primarily to show the natural resources of the state of Kentucky. The museum has recently been removed from Frankfort to Lexington and is now being systematically arranged.

LOUISIANA

Louisiana state university and agricultural and mechanical college museum, Baton Rouge. The collections are distributed among the various departments and are in charge of the professors of each department.

Geology and mineralogy. Collections representative, classified and arranged.

Zoology. Several cabinets of mammals and birds; five large cabinets of shells; several hundred jars of invertebrates (all the types represented); a few dried specimens of invertebrates and a few skeletons; also many charts and drawings.

Entomology. 150 cases of insects principally southern.

Botany. Between 1500 and 2000 classified specimens and a great deal of material preserved in formalin and alcohol.

There has been recently established on the Gulf of Mexico, in Louisiana, a gulf biologic station through which the collections of this institution will be greatly increased.

Tulane university of Louisiana, Tulane museum, New Orleans. George E. Beyer, *curator and professor of biology and natural history.*

Paleontology. 3000 fossils and casts of fossils, of general distribution. The entire department is in course of reconstruction just at present.

Mineralogy. 5000 specimens: one of the largest collections in the south, representing between 400 and 500 species and varieties.

Historic geology. 300 specimens: a general stratigraphic series, illustrating rocks of the various formations and periods from the Archaean to the Quaternary; and a special series illustrating the geology of New York.

Zoology. Collections illustrate all classes and nearly all orders, those in mammalogy, ornithology, herpetology, ichthyology and conchology being extensive and specially representative of Louisiana and the southern states. Invertebrate zoology is fairly well represented, and is particularly complete in Mollusca.

There is a very good collection of glass models, made by Blaschka. Osteologic collections include complete and partial skeletons, skulls, sternums, etc.

Botany. 45,000 specimens: herbariums of Dr Josiah Hale; Prof. John Riddell; W. M. Carpenter; Herman Curtins; F. Laskar's herbarium of about 300 European medicinal plants, and Prof. T. G. Richardson's collection of cryptogams, consisting principally of Filices from South America.

Ethnology. Collection small, with the exception of the American section. There are two Egyptian mummies, with cases and wrappings, one of which is the remains of Got-Thoti-Auk, an official of high rank under Osorkon 2. The American section contains chiefly skeletons, skulls, implements and pottery of the aborigines. Mound investigations have been carried on by the curator during the last three years. Much valuable material has been accumulated. Many duplicates for exchange which may be obtained on application.

MAINE

Bates college museum, Lewiston. Arthur L. Clark, *professor of physics.*

Collections limited but representative and increasing yearly. Minerals and Carboniferous plants most prominent among the geologic material.

Bowdoin college, Brunswick. No report.

Colby college museum, Waterville. W. S. Bayley in charge.

Paleontology. 1500 specimens: general, arranged to illustrate lectures on historic geology.

Mineralogy. 3000 specimens: general.

Lithology. Exhibits: the Rosenbusch collection of typical rocks; building stones of Maine; American type specimens of rocks; also the Maine state geologic collection, embracing specimens obtained from C. T. Jackson during the first survey of the state in 1837-39.

Zoology. 500 specimens: a few mounted skeletons, and a number of alcoholic specimens.

Botany. 800 mounted specimens illustrating partially the flora of the state.

Ethnology. A set of Ward's collection of masks of Indians of the Pacific coast.

Kennebec historical society, Hall Lithgow library building, Augusta. Elizabeth M. Le Prohon, *secretary.*

Some small collections in natural history, prominent among which is a general collection of minerals.

University of Maine museum, Orono. Gilman A. Drew, *professor of biology*, in charge.

Paleontology. 1000 specimens arranged to illustrate briefly the fauna and flora of all geologic periods.

Mineralogy. 600 specimens: a general collection of 500 specimens, and a good representation of Maine minerals; an economic collection of 300 specimens.

Geology. A series of specimens illustrative of stratification and other characteristics of sedimentary rocks.

Lithology. 300 specimens.

Zoology. 2500 specimens: leading forms of both vertebrates and invertebrates of Maine; enough exotic forms for illustration of types. Material for exchange.

Botany. 15,000 specimens: the Halsted collection of New England lichens; the Cummings and Seymour collection of lichens; Cook's illustrative collection of fungi; the Ellis and Evehad collection of fungi; the Underwood collection of liverworts; the Sullivan and Lesquereaux collection of mossés; the Blake herbarium of 10,000 specimens of crytogams and phanerogams; a special herbarium of phanerogams and cryptogams of Maine; the Halsted collection of weeds and the Harvey collection of weeds and forage plants of Maine.

Ethnology. 150 specimens gathered in Maine.

The museum is giving special attention to its collection from Maine, particularly the mammals.

MARYLAND

Johns Hopkins university, Baltimore. William Bullock Clark, *professor of geology*, assisted by Harry F. Reid, *professor of geologic physics;* Edward B. Mathews, *associate professor in mineralogy and petrography*; George B. Shattuck, *associate professor of physiographic geology.*

The paleontologic and geologic collections are described in the university publication, *Retrospect of 20 years, 1876–1896*, as follows.

The collections of the geological department consist primarily of a large amount of material brought together from Maryland and adjacent states of Virginia, Pennsylvania, Delaware and New Jersey, and include representatives of most of the important rock types, fossils and minerals from the several formations of this territory. The collections are especially rich in crystalline rocks and in Cretaceous and Tertiary fossils. Some of this material has already been described, while much awaits further study. In addition to the large amount of material thus brought together from the surrounding region, the following special collections form a portion of the university's possessions:

The Williams collection contains several thousand objects, consisting of extensive suites of specimens and of thin sections of minerals and rocks from the best known and most thoroughly studied localities in both Europe and America. They have recently been presented to the university by Mrs Williams.

The Lewis collections of rocks and thin sections, numbering over 1000 specimens, have been deposited with the university by Mrs Lewis. These specimens were collected by the late Prof. H. Carvill Lewis, and include carefully selected materials, especially from Pennsylvania, Germany, Switzerland and South Africa.

The Krantz collection of fossils contains several thousand specimens from the best known localities in Europe, being representative of all the different horizons.

The Hill collection contains a large number of specimens of rocks and characteristic fossils from the Cretaceous formations of Texas, collected by Prof. R. T. Hill, of the United States geological survey. It was presented to the university by Messrs Jesse Tyson, Francis White, Mendes Cohn, W. T. Dixon and D. C. Gilman.

The Stürtz collection comprises a suite of over 400 hand specimens and accompanying thin sections. These represent the rocks

cited by Prof. Rosenbusch in his *Mikroskopische physiographie* and are from the type localities.

The Lehmann collection, a suite of specimens and thin sections gathered by Prof. J. Lehmann, was sent by him to the university to illustrate his well known work on the crystalline schists.

The Allen collection of minerals, which is especially rich in early discoveries from American localities, includes many of the type specimens illustrating the papers of Prof. O. D. Allen, late of Yale university.

There are also private collections made by Prof. Clark and others of the department; also numerous small collections acquired by gift, exchange or purchase, among others from the United States national museum, the national surveys of Russia and Canada, the universities of Berlin, Göttingen, Harvard, Yale, Chicago, Iowa, Michigan, Alabama, etc., as well as from individuals in this country and in Europe.

Apparatus. Among the models are the following:

1 A set including Europe, Asia, Africa, North America, South America, United States and Pennsylvania, placed in the custody of the university by E. H. Butler & Co. of Philadelphia.

2 A large relief of the state of Maryland on the scale of 2 miles to an inch prepared for the World's Columbian exposition and deposited by the state geological survey.

3 A model of Baltimore and vicinity on the scale of 4 inches to the mile without vertical exaggeration, all of the above being the work of Cosmos Mendelef of Washington.

4 The Shaler and Davis models illustrating the development of topographic form and geologic structure.

5 The Heim models showing the structure of volcanic cones, glaciers, Alpine valleys and coast lines.

6 Models illustrating the development of the Ammonites and the different types of Foraminifera.

7 Several hundred models illustrating different phases of geology, paleontology and mineralogy.

In addition to the above there are several hundred lantern slides and photographs.

Library. The library in geology is very large and rapidly increasing. It contains over 6000 bound volumes and 10,000 unbound volumes and pamphlets, among them the libraries of the late Professors Williams and Lewis and the meteorologic library of Prof. Cleveland Abbe, besides several large collections of books recently purchased by friends of the university. The library is particularly rich in books of reference, containing full sets of most of the important journals as well as the publications of foreign official surveys and museums. The books cover the fields of general geology, paleontology, petrography, economic geology and mining.

Maps. Extensive suites of maps, and among them, these:

1 A set of topographical and geological maps prepared by the United States geological survey; maps prepared by the United States coast and geodetic survey, Mississippi and Missouri river commissions, United States land office, and many of the earlier national surveys.

2 Maps prepared by the various state geological and topographical surveys in the United States.

3 Partial, and in some cases complete, sets of topographical and geological maps prepared by the national surveys of Great Britain, including many of the colonies (especially Canada and Australia), France, Germany, Austria, Russia, Norway and Sweden, Italy, Holland, Belgium and Japan.

The botanic collections are described in the same publication as follows:

1 The Schimper collection of European and African flowering plants, of about 4300 sheets, the gift of Dr A. F. W. Schimper, now professor of botany in Bonn;

2 The Fitzgerald collection of American and European mosses, including about 1000 sheets, the gift of Mr Charles H. Fitzgerald, formerly of Baltimore.

Deposited with the university and available for use in its work are:

3 The local collection of flowering plants and ferns belonging to the Naturalist's field club, of about 1400 sheets;

4 The collection of American cryptogams, chiefly algae and fungi, belonging to Dr J. E. Humphrey, comprising about 2500 sheets.

Accessible to suitably prepared students, is the remarkable herbarium of Capt. John Donnell Smith of Baltimore, representing the flowering plants and ferns of many parts of the world, especially rich in the flora of tropical America, including some 85,000 sheets. The owner of this collection has generously offered to give it to the Johns Hopkins university when a suitable place can be provided for it.

Maryland academy of sciences, Baltimore. P. R. Uhler, *president;* William Wolle, *curator;* John Widgeon, *collector.*

Paleontology. 500,000 specimens nearly all from Maryland localiti s, from all formations in the state; Lower Helderberg and Oriskany exceptionally well represented. Triassic dinosaurian tracks; Jurassic and Lower Cretaceous plants.

Historic and economic geology and lithology. A few hundred specimens. Gneisses, granites, diorites, marbles, sandstones

and clays; geodes, stellate masses of selenite, large crystals, models, diagrams, photographs, etc.

Photographs for exchange.

Mineralogy. 5000 specimens. Over 2000 species from European and American localities. The Dr F. E. Chatard, the Dr Riley and the Dr E. A. Dalrymple collections. Many rare forms from the Bare Hills, Jones Falls, Mineral Hill, the Blue Ridge mountains and other Maryland localities.

Zoology. Many thousands of specimens representing the whole fauna of Maryland. A large series of mounted birds and mammals, reptiles and fishes are exhibited. The birds of Maryland are mounted in separate upright cases showing changes of plumage, with young, nests and eggs, etc. A very extensive collection of insects of all orders from all parts of Maryland.

There is a general collection of shells, specially rich in Unios.

Botany. A nearly complete collection of the plants of the state representing about 1500 species, 500 of which are fungi.

Ethnology. 10,000 specimens mostly Indian relics from Maryland.

Maryland geological survey, Baltimore. William Bullock Clark, *state geologist.*

Paleontology. Collection at present incomplete, but arranged to illustrate the Paleozoic, Mesozoic and Tertiary formations of Maryland.

Mineralogy. Preliminary and incomplete collection illustrating a large variety of species.

Historic geology. Collections incomplete but containing a large amount of material from the Devonian, Carboniferous, Eocene, Miocene and Pleistocene formations. A systematic collection consisting of fossils, rocks, ores, etc., representing all geologic formations, from Maryland localities, is exhibited in cases in the entrance hall of the Administration building.

Economic geology. Part of the collections are exhibited in two rooms on the ground floor of the Administration building. One room is devoted to stone and contains 60 dressed and polished cubes 8 x 8 x 8 inches of building stones from Maryland quarries,

4 polished granite risers 7 feet by 1 foot 6 inches and 4 large turned columns of granite, marble, serpentine and red sandstone, a collection of polished slabs of ornamental marbles 8 x 4 and 4 x 4 inches and slabs of polished marble and serpentine 40 x 30 inches. There are also other columns and blocks of granite, serpentine, etc. The Triassic breccia, known as the Potomac marble, from Frederick county is represented by a large polished column, slabs, blocks and partially polished boulders, and the slate of Hartford county by a series of specimens of rough blocks, split and finished slates. Samples of road-making rocks are shown with the results of tests to which they are subjected. A series of tested specimens from all available quarries in the state are kept in storage.

The other room contains principally clays and clay products. A series of clays from all the principal producing localities is kept, a typical collection being exhibited in glass jars. Pottery is well represented from most of the Maryland producers, terra cotta is shown in ornamental pieces and such blocks as are commonly used in building construction; gas retorts, furnace blocks, fire brick, stove lining and glazed bricks show the uses of fire clay, pressed brick are shown in the construction of an ornamental mantel and in panels. There is also a series of sands, ground quartz, talc, etc., shown in jars and a set of the most typical soils of the state are shown in bulk and divided into their component parts of gravel, sand, silt, clay, etc.

There is a reserve series of coal specimens kept in jars and the results of their analyses. The series of coals on exhibition consists of large cubes representing the principal coal seams of the state. Relief and geological maps and transparancies occupy the windows and wall space.

There is a geologic library of over 1000 volumes consisting largely of official reports of the national and state surveys.

Rock Hill college museum, Ellicott City. The Rev. Bro. Fabrician F. S. C. in charge.

Mineralogy. 2000 specimens for educational purposes. Used specially in connection with the study of chemistry.

Historic and economic geology. 50 specimens from the various rock formations in the vicinity of Ellicott City.

Botany. 2500 specimens including the herbarium of Prof. W. E. H. Aikin; a set of carices from Dr H. P. Sartwell of Penn Yan N. Y. and a complete set of the ferns of Howard county, Md.

Ethnology and anthropology. 800 specimens including a rare lot of specimens from Ceylon consisting of native manuscripts, photographs, coins, idols, musical instruments, trinkets, etc. Also many plaster casts of American Indian relics.

Western Maryland college, Westminster. No report.

Woman's college museum, Baltimore. Arthur Bibbins, *director.*

Paleontology. 10,000 specimens consisting of a general systematic collection of fossil animals and plants; a collection to illustrate historical geology on exhibition and a similar series for students use and a collection of miscellaneous material for determination by students. The collections are particularly rich in fossil plants from the Potomac group of Maryland and include among other types Cycadeoidea bibbinsi, clarkiana, fisherae, fontaineana, goucheriana, mcgeeana, and uhleri, all of Ward; Cupressanoxylon bibbinsi Knowlton, and many others. Also the type skulls of Cetatherium crassangulum and Metopocetus durinasus, of Cope.

There are also some interesting Dinosaurian remains from Maryland localities.

Some Potomac Cycadeoidea and Miocene fossils for exchange.

Mineralogy. 20,000 specimens. A general exhibition series and a students series. The collection is specially rich in minerals from the vicinity of Baltimore.

Much material for exchange.

Economic geology. 5000. There is a large collection of iron ores from European and other localities as well as complete series from the once extensively worked mines of limonite and siderite of Maryland; also collections of tin, copper, zinc, lead, manganese, chrome and other ores.

Lithology. 5000 specimens. Series of clays, etc., representing the lithology of the Potomac group. Crystalline schists and igneous rocks of the Piedmont highlands of Maryland. United States geological survey educational series, etc.

Gabbro, gabbro diorite, Websterite, lherzolite, etc., described by Williams from Baltimore county for exchange.

Zoology. 20,000 specimens. General systematic series; collections of mounted and unmounted mammals and birds; a large collection of North American birds eggs, collections of mollusks, echinoderms and coelenterates, and a large collection of American and foreign lepidoptera.

Botany. 25,000 specimens, including the Edward Rowland, the Lotzy, the Humphrey and the Metcalf herbariums.

Ethnology and anthropology. 3000 specimens of American Indian remains from many localities. The local collections are very extensive. There is also a good lot of Egyptian and Babylonian material and a fine series of Mexican objects, including a series of casts of heads of native Mexicans.

The museum also contains sections of fine arts and collections of numismatics, archeologic and historic objects. The philosophical society holding monthly gatherings is under its auspices. Series of public lectures are given during the winter.

MASSACHUSETTS

Amherst college, Amherst. 1 WOODS CABINET. B. K. Emerson in charge.

Paleontology. 20,000 specimens, constituting a good general representation of the American formations, and best representing the Triassic of the Connecticut valley. There is also an exceptionally full series of vertebrate fossils from the southern Pleistocene formations; a general collection of foreign material; and a unique series of Carboniferous fishes from Scotland. Considerable material for exchange.

Mineralogy. The Shepard mineralogic collection includes 10,000 specimens of a general nature, while the collections of rutile from Massachusetts and the southern Appalachian region,

tourmalin from Paris Me., and the collection of gems, are particularly complete. The Shepard meteorite collection includes 118 aerosiderites and 180 aerolites. Material for exchange.

Lithology. 2000 specimens chiefly illustrating concretionary formations and metamorphism. A large collection in general lithology with many thin sections. Large collections illustrating the early geologic surveys of the New England states, Vermont by Prof. C. B. Adams, Connecticut by Prof. C. U. Shepard, Massachusetts by Pres. E. Hitchcock which have great historical value.

2 APPLETON CABINET. The Hitchcock ichnologic collection contains more than 20,000 specimens of reptilian tracks found in the sandstone of the Triassic formation.

Zoology. The Adams collection of shells comprising 15,000 specimens of 1200 species and a good general collection for illustration of zoology.

Botany. 4000 specimens; phanerogams, cryptogams, and other forms of lower vegetable life.

Ethnology and archeology. 1500 specimens: the Gilbert museum, a collection of stone relics of the American Indians found within 50 miles of Amherst college; 500 specimens of bas-reliefs, cylinders, coins, and seals from Nineveh and Babylon. Large slabs from Nineveh also line the walls of the entrance hall of the library.

Boston society of natural history, Boston. Museum staff: W. O. Crosby, *assistant in mineralogy and geology;* Miss M. E. Carter, *assistant in botany;* Miss L. R. Martin, Mrs J. M. A. Sheldon, Miss E. B. Bryant, *museum assistants.*

Paleontology. 22,847 specimens: the Eser general collection from south Germany of 8809 specimens, including a number of Oppel's and Heer's and one of Meyer's types; 4810 specimens of European species; 8478 specimens of American forms, including a few types; and a collection of New England fossils numbering 750 including type specimens of trilobites from Braintree Mass.

Mineralogy. 5000 specimens: representing the various groups somewhat uniformly; a special collection of 1000 New England minerals.

Geology. 4000 specimens, most fully representing the divisions of dynamic geology and petrography (lithology and petrology); historic geology not prominent.

Zoology. 120,000 specimens: mounted mammals, 118; mounted birds, 12,328, including the Lafresnaye collection, containing more than five hundred types; Samuel Cabot's collection with his types, and the Bryant collection named by Ridgway; 5000 unmounted bird skins, and 5200 birds eggs; 1000 mounted specimens received from the Boston museum and including a large part of the collection formerly in Peale's museum in Philadelphia. Among these are a number of Wilson's and Bonaparte's types and specimens figured in their works on American ornithology, also a number of specimens from both the Lewis and Clark's and Long's expeditions; reptiles, 817; amphibians, 424; fishes, 4500; mollusks 35,000, including many of the type specimens described by Gould, Bland and Binney, Achatinellae described by Gulick, and Strophias described by Maynard; crustaceans, 2500; insects 50,000, including the Harris collection, some specimens of which were named by Thomas Say, and the Burnett collection; including a number of type specimens of parasites; worms, 800; echinoderms, 1700; coelenterates, 1000; and sponges, 1475.

The Wyman anatomic collection contains many of Dr Wyman's type specimens.

Botany. 85,280 specimens: the John A. Lowell herbarium of 17,780 specimens; the C. J. Sprague collection of 2550 North American lichens; part of the Cummings, Williams and Seymour collection, 250; the Seymour and Earle collection of 450 specimens of economic fungi; a special New England collection of 4750, and the society's general herbarium of 39,500 specimens; preparations and originals from the microscopic collections of Bailey, Glenn, Greenleaf, Habirstraw, Burnett and Wyman.

Ethnology. Collections have been given to the Peabody museum of archeology and ethnology in Cambridge.

The plan of the museum has been limited in order that its growth might not interfere with the prosperity of the society and its most important function, the publication of original re-

searches. The departments of mineralogy, geology, synoptic botany and zoology and paleontology are preceded by an explanatory department giving illustrations of the principles of dynamic geology and biology. Each of these is limited in its scope, so far as exhibition is concerned, so as to teach as far as practicable, the evolution of typical structures and forms. These together form the educational series. Above these are placed the systematic collections in exactly the same order, the principle being that each department in its public exposition shall be a lesson in evolution founded on the available gradations of forms, and the whole series of departments repeat and enforce this proposition. The birds are not included in this arrangement. They have been placed on exhibition in accordance with old-fashioned standards. There is now also a New England collection in each department. These will be eventually collected into one grand series to form a New England museum which, it is hoped, will not be limited in its scope, but will strive to give a complete presentation of the natural history of New England.

Cape Ann scientific and literary association, Gloucester. Thomas Conant, *president.*

Mineralogy. 1000 specimens.

Zoology. 500 specimens: fishes and marine invertebrates found off Cape Ann.

Conchology. 200 specimens.

Botany. 200 specimens: ferns and grasses.

Ethnology. A few Indian implements found in Essex county, Mass.

City library association, natural history museum, Springfield. William Orr, *curator;* Grace L. Pettis, *assistant curator.*

Paleontology. 500 specimens: general, the Upper and Lower Silurian, Carboniferous and Triassic formations being best represented.

Mineralogy. 1300 specimens: representing all important species; 346 specimens of local minerals.

Lithology. 175 specimens of local rocks.

Historic geology. Specimens from the Triassic sandstone of the Connecticut valley showing fossil footprints.

Dynamic geology. 650 specimens.

Zoology. 4200 specimens: a series of mammals; a series of mounted birds, 12 bird groups, three mammal groups and a collection of the eggs of local birds; a few skeletons; a series of fishes; a series of corals, and collections of shells and of local insects.

Botany. A series of North American woods; woods of Nassau and California; an exhibit of Indian corn, and one of vegetable fibers. Herbarium, 1014 sheets.

Ethnology. 2000 specimens: Mexican curios; local relics of the American Indian; Russian and Scandinavian material; casts of some prehistoric implements; some relics of the colonial and revolutionary wars.

Clark hall and Thompson biological laboratory, Williams college, Williamstown. H. F. Cleland, *instructor in geology and botany,* in charge of Clark hall, and S. F. Clarke, *professor of natural history,* in charge of the biologic laboratory.

Paleontology. 3000 specimens: fair representation of all formations, augmented by Emmons's valuable type specimens from the Triassic strata of North Carolina.

Mineralogy. 1250 specimens: general, best representing calcite, augite, hornblende and scapolite.

Historic geology and lithology. A petrographic collection of 500 specimens; a series of 250 illustrating structural geology; material from the local geology about Williamstown.

Zoology. 1000 specimens of mollusks in Clark hall; many forms of mammals, birds, fishes, and invertebrates, Jackson Hall.

Botany. Three or four separate herbariums of importance; minor collections of Hepaticae and Musci.

Ethnology and *archeology.* A cast of the Rosetta stone; three Assyrian slabs obtained by Rawlinson and Layard; several Babylonian blocks with cuneiform inscriptions; Central American sculpture and sundry articles collected by missionaries; local antiquities relating to the French and Indian wars.

College of Holy Cross, Worcester. No report.

Harvard university museum, Cambridge. Alexander Agassiz, *director;* Nathaniel Southgate Shaler, *professor of geology;* William Morris Davis, *Sturgis professor of geology;* John Eliot Wolff, *professor of petrography and mineralogy,* curator of mineralogy; Charles Palache, *assistant professor of mineralogy;* George Lincoln Goodale, *professor of natural history;* William Gibson Farlow, *professor of cryptogamic botany;* Benjamin Lincoln Robinson, *Asa Gray professor of botany.*

Geology. The geologic collections illustrate dynamic, historical and other branches of geology, physiography and geography, etc. There are three rooms provided for exhibitions but aside from a large model by Curtis of the Boston metropolitan district there are as yet no exhibits in these rooms.

Mineralogy. The collection was founded in 1793 and is the oldest natural history collection in the university and probably the oldest public collection of minerals in America. The public collection is exhibited on two floors of the mineralogic section of the museum in flat floor cases and vertical cases arranged against the walls.

The lower or main floor contains the systematic collection arranged according to Dana's system, including about 10,000 specimens with the special collections arranged in the upper floor or gallery. The latter include a collection of 600 agates, partly cut and polished, collections illustrating the physical characters of minerals, and will ultimately include a small collection of rocks. In the gallery is the Hamlin collection of tourmalins, from Paris Me., the largest in existence. The collection of meteorites includes examples of 291 falls with a total weight of 2700 pounds; in 24 falls the museum has the largest amount of that fall. In the laboratories and workrooms connected with the museum are duplicates, specimens used for teaching etc., which bring the total mineral specimens worth enumerating to about 25,000; there are also a great many thousand specimens of rocks, with thin sections. The mineralogic museum includes a large number of rooms amply equipped for

research and teaching, including a chemical laboratory, workshop equipped with power, room for work with optical instruments, drawing room and laboratories for students.

Comparative zoology. The exhibition space in the synoptic department is divided into a series of rooms, 30x40 feet, devoted to systematic collections of typical animals, represented by mounted skins, skeletons, alcoholic and other preparations, with the object of showing the natural relationship of one class of animals with another. There are also collections to illustrate geographic distribution and rooms devoted to faunal collections of Europe, South America, etc., and to the faunal regions of the Atlantic and Pacific oceans.

The bulk of the collections are stored in trays or drawers systematically arranged so as to afford easy reference and associated with such books and facilities as may be needed for their study.

There is no information obtainable as to the extent of the collections in this museum.

Botany. The Botanical collections comprise (1) the Gray Herbarium, containing more than three hundred thousand sheets of mounted specimens. (2) the Cryptogamic Herbarium, and cases for the display of selected specimens to illustrate the principal groups of algae, fungi and lichens. (3) the Economic Museum, having, besides the material for investigation and comparison, exhibition cases filled with specimens illustrating the useful plants and their products. (4) the Ware Collection of Blaschka Glass Models of Plants and Flowers, now containing about seven hundred complete specimens of plants in flower, together with about thirty five hundred analytical details. (5) the Paleontological collection. (6) the Botanic Garden and its Greenhouses, together with Botanical Laboratories and a Lecture-room. (7) Botanical Laboratories and Lecture-rooms in the University Museum Building.

PEABODY MUSEUM OF AMERICAN ARCHEOLOGY AND ETHNOLOGY, Harvard university. Frederic Ward Putnam, *curator and Peabody professor of American archeology and ethnology;* Charles C.

Willoughby, *assistant curator;* Alice C. Fletcher, *assistant in ethnology:* Zelia Nuttall, *honorary assistant in Mexican archeology;* George Byron Gordon, *assistant in Central American archeology;* Jane Smith, *assistant librarian;* Frances H. Mead, *assistant and secretary;* Frank Russell, James H. Woods and Roland B. Dixon, *instructors in anthropology.*

The arrangement of the collections is intended to facilitate research in general anthropology, with special reference to American and comparative archeology and ethnology. The upper hall and one of the galleries are given to the Hemenway collection of archeology and ethnology of the southwestern tribes. The collections of American archeology are specially important and extensive from Peru, Colombia, Central America and Mexico, southwestern United States, the Ohio, St Johns and Delaware valleys, New England and the Pacific coast. The museum contains also archeologic collections from the French gravels and caves, from Denmark, from the Swiss lakes, and from many other regions; ethnologic collections from various parts of the world; and an important collection of human craniums and skeletons. These collections furnish the means for making direct comparisons between the art and culture of various peoples.

The regular publications of the museum are annual reports, special papers and memoirs.

SEMITIC MUSEUM, Harvard university. David Gordon Lyon, *curator.*

The Assyrian room contains casts of large collections of Assyrian, Babylonian and Hittite bas-reliefs; stone and clay tablets written in cuneiform; cylinder seals and other objects in bronze, clay and stone of Babylonian-Assyrian origin. The Palestinian room contains collections of stone inscriptions, manuscripts, coins, pottery, glass vases, bronzes, bas-reliefs, sarcophagi, etc., and photographs and collections illustrating the geology, botany and zoology of Palestine. The museum was founded by Jacob H. Schiff and was designed as the home of Semitic instruction. The library, lecture rooms, students and curators are also in the building on Divinity avenue.

Leominster public museum, Leominster. E. G. Davis, *curator.*

Paleontology. 50 specimens: fossils from various formations.

Mineralogy. 700 specimens: some interesting quartz crystals; ores and chalcedony from Colorado.

Lithology. Specimens of local granites, schists and slates.

Economic geology. Building stones, ores of precious metals, clays and grits.

Historic geology. A series of specimens and photographs illustrating the effects of the glacial period on topography.

Zoology. 200 specimens: a series of the local mammals and birds; a collection of marine shells.

Botany. 710 specimens, illustrating the local flora, ferns of Ceylon, and algae.

Massachusetts agricultural college, Amherst. R. S. Lull, *curator of museum of zoology;* G. E. Stone, *in charge of botanic museum;* H. T. Fernald, *in charge of entomologic collection;* S. F. Howard, *in charge of mineralogic collection;* J. B. Paige, *in charge of veterinary museum.*

Paleontology. About 300 specimens consisting of a small collection of invertebrate fossils for illustration in geological instruction.

Mineralogy. About 225 minerals representing groups designated by Dana and duplicates for use in determinative mineralogy.

Historic and economic geology and lithology. Soils and rocks of the state collected by Edward Hitchcock and catalogued in the *Report on the agriculture of Massachusetts* for 1858. Of the 2900 specimens which passed through a fire in 1885, 2600 have been identified and classified by Dr E. R. Flint.

Zoology. 9000 specimens consisting of a representative collection of invertebrates (not including insects) and a series of mounted mammals, birds, reptiles, amphibians and fishes, both skins and skeletons, besides numerous alcoholic specimens of the three lower classes.

Entomology. 30,000 specimens including all orders of insects and such other terrestrial arthropods as are of economic im-

portance. Under certain conditions exchanges are sometimes made.

The private collection of Prof. C. H. Fernald consists mainly of Microlepidoptera comprising nearly all of the described species of the family Pterophoridae of North America and Europe and many from South America; all the types of Fitch except one which is not in existence; all the types of Fish as well as his own types and cotypes of nearly all of the species described by Lord Walsingham from North America. It includes about nine tenths of all the types of the described species of North America belonging to this family.

Of the Tineina it contains a large number of authentically named species of North and South America together with all of his own types, a large number of those of Chambers and Miss Murtfeldt and cotypes of most of the species described from North America by Lord Walsingham.

Of the Pyralidae it contains authentic specimens of nearly all the described North American species, and many from Mexico, Central America, the West Indies, South America, Europe and other parts of the world; all of his own types and many cotypes of Hulst and Grote. This collection is rendered more valuable from the fact that the owner has compared it with all the collections in all the American and European museums containing types of North American species and critically compared and marked as homotypes such as were thus proved to be exactly like the types.

The number of species of the family Tortricidae in this collection is larger than that of any other collection in existence, being about twice as large as that of the British Museum and three times as large as that of the Berlin or Vienna museums with which it has been compared. It contains a very large number of types and cotypes as well as homotypes having been compared by the owner with nearly all of the Tortricid types in existence.

Botany. This collection consists of a herbarium in which all classes of plants are represented except the algae. It also contains sections of most of our Massachusetts woods, many forms

of natural and artificial grafts and the results of interesting physiologic experiments conducted by Pres. Clark, a collection of economic seeds, considerable miscellaneous material and some material of horticultural value such as models of fruits, etc.

The herbarium includes about 15,000 species of flowering plants and about 10,000 species of cryptogams, the latter represented by mosses, lichens and fungi.

The only specimens for exchange are the few duplicates of English mosses collected by Baker.

Ethnology and anthropology. Small collection of about 200 specimens of Ainu relics from Sapporo, Island of Yezo, Japan; 50 specimens: Egyptian material, Mexican pottery, and relics of the American Indians; an interesting collection of books, pamphlets, and manuscripts, and various relics, connected with the domestic life and industries of the early settlers of the town.

This museum is connected with the public library, both of which were established and built by popular subscription for the purpose of preserving historic matter and relics of olden times. It is therefore almost exclusively of local interest, with little, if anything, for general exchange.

Massachusetts institute of technology, Boston. William H. Niles, *professor emeritus of geology;* William O. Crosby, *associate professor of structural and economic geology;* George H. Barton, *assistant professor of geology;* Charles H. Warren, *instructor in geology.*

Paleontology. 10,000 specimens.

Mineralogy. 10,000 specimens.

Economic geology and petrography. 8000 specimens.

Structural geology. 2000 specimens.

Peabody academy of science, East India Marine hall and an addition, Salem. Founded in 1867 by George Peabody of London "for the promotion of science and useful knowledge in the county of Essex." George Augustus Peabody, *president;* Abner C. Goodell, *secretary of trustees;* John Robinson, *treasurer;*

Edward S. Morse, *director;* John H. Sears, *curator of mineralogy and geology;* Lawrence W. Jenkins, *curator of ethnology.*

Paleontology. Small synoptic exhibit of specimens illustrating the historic geology of the earth, from the oldest to the most recent formations.

Mineralogy. A complete exhibit of the minerals of Essex county (450 specimens); also 960 specimens, illustrating the school edition of Dana's *Mineralogy.*

Historic geology and lithology. A general collection of 2000 specimens illustrating historic geology; 725, illustrating the historic geology of Essex county; microscopic sections illustrating the petrography and photographs of geologic features of Essex county.

Geology. A synoptic collection illustrating the historic geology from the oldest to the most recent formations; a very full collection of the rocks of Essex county; thin sections for microscopic study, illustrating the petrography, and photographs of geologic features of Essex county.

Zoology. Nearly complete series filling 150 running feet of wall cases, of the animals of Essex county; a synoptic collection illustrating the animal kingdom from the lowest to the highest forms, arranged and labeled according to textbooks commonly used in schools and colleges of the state.

Botany. A herbarium of 4000 sheets of the plants of Essex county; a large collection of woods of the county; a general collection illustrating the vegetable kingdom and a general reference herbarium.

Archeology. A large collection of the prehistoric relics of Essex county; smaller collections representing other parts of the United States, European countries and Egypt.

Ethnology. A collection arranged by countries, illustrating the costumes, customs, implements of war and of domestic use, and objects of art of the native races of China, Japan, India, Malay archipelago, Siam, Korea, Africa, the islands of the Pacific, North and South America, etc.

This museum contains the collections of the East India Marine Society, founded in 1799, and has had an uninterrupted existence since that date.

One of the objects of the society was to form a museum of natural and artificial curiosities. The museum was begun at this time by the donation of the extensive private collection of Capt. Jonathan Carnes. Owing to the unusual facilities enjoyed by the earlier members of the society some of the results now attained are the Korean collection, one of the most important in the country; the Japanese collection, which is by far the largest in the world; and important collections of ethnologic material from the South Sea islands.

The museum is also rich in local material. The collections in botany, zoology and mineralogy of Essex county being very complete.

Since 1867 large additions have been received from the Essex institute and through the trustees and director of the academy.

There is also in the museum a historical collection of portraits of prominent Salem merchants, members and officers of the East India marine society, together with many interesting relics connected with the early history of that institution, and models and pictures of Salem merchant vessels, a suggestive memorial of the commercial history of the city.

Smith college museum, Northampton. Harris H. Wilder in charge.

The collections are small but increasing along the lines most necessary for teaching purposes. There are a few cases of typical minerals and fossils and a few hundred specimens in botany and zoology. The aim is to arrange specimens to illustrate lectures, each important class of animals is represented by a few selected specimens, as for instance, a skeleton and other anatomic preparations.

Worcester natural history society, 12 State st., Worcester. Bessie L. Dewhurst, *custodian of the collections*; Herbert D. Braman, *superintendent of the cabinet.*

Paleontology. 500 specimens: Vertebrata, 150; Articulata, 50; Mollusca, 250; Radiata, 300; and Protozoa, 50.

Mineralogy. 3000 specimens: 2700 specimens of wide distribution; 300 illustrating the minerals of Worcester county.

Historic geology and lithology. 3500 specimens: alluvial and diluvial material; the Eocene, Miocene, Pliocene and Carboniferous formations; chalk, greensand, oolite, red sandstone, coal, limestone, clay slate, mica slate, gneiss and eruptive rocks; rocks of Worcester county.

Zoology. 15,000 specimens: mammals, 630; birds, 400, 300 nests and eggs; reptiles, 165; fishes, 70; insects, 2000; crustaceans, 75; and 8000 lower invertebrates.

Botany. 1500 specimens: miscellaneous herbarium illustrating the flora of North America and of England; and a herbarium of Worcester county flora.

Collections specially illustrative of Worcester county.

Any of the specimens are lent for private study, and to the Worcester public schools for illustration of natural history lessons. Classes in various branches of natural history, both for adults and children, are conducted yearly.

MICHIGAN

Albion college, Albion. No report.

Alma college, Francis L. Hood memorial museum, Alma. E. H. Harper, *professor of biology, curator*, with one assistant, who is usually a student.

Paleontology. 2500 specimens: the Shroyer-Wilcox collection of 1000 species from the Cincinnati group; large general collection; two or three hundred species mainly corals from the drift and representing the various Lower Silurian types.

Mineralogy. 5000 specimens: silicates from Maine; lead and zinc ores from Joplin Mo.; and iron and copper ores from the upper peninsula of Michigan.

Historic and economic geology. 1000 specimens, illustrating the historic geology of the state; metamorphosis and degradation of rocks; building stones of the state; metals, their ores and products.

Zoology. 2500 specimens: Michigan mammals; birds of Michigan, with nests and eggs; birds of Florida, and a few species from Arizona; some alcoholic specimens of invertebrates; small

collection of tropical shells; and an incomplete series of Michigan shells. Local species for exchange.

Botany. 2000 specimens: local spermatophytes and pteridophytes; also some local forms of fungi and algae. Duplicates for exchange.

Ethnology. 200 stone implements of the American Indians.

Detroit museum of art (including the Detroit scientific association), Detroit. D. M. Ferry, *president;* George N. Brady, *vice-president;* Frederick E. Farnsworth, *secretary;* Collins B. Hubbard, *treasurer;* A. H. Griffith, *director.*

For list of collections, see Addenda, p. 222.

Hillsdale college, Hillsdale. No report.

Michigan college of mines, Houghton. A. E. Seaman, *professor of mineralogy and geology* in charge.

Paleontology. 1000 specimens for use in illustrating lectures; 3100 for use of students; a small type collection of living and fossil forms arranged zoologically in accordance with Nicholson's *New manual of paleontology;* 1000 fossils arranged zoologically and chronologically.

Mineralogy. 35,756 specimens: 151 crystal models in glass, 2153 crystal models in wood and plaster, 2260 natural crystals to illustrate crystallography; 485 specimens to illustrate physical and optical properties of minerals, pseudomorphs, etc.; a lecture exhibit of 10,000; 17,025 for use in laboratory work; an exhibition collection of 2550 specimens including the Emmerson collection of 550; and 2132 microscope slides of minerals.

Lithology. 18,248 specimens: a lecture collection of 3800 rocks; a laboratory collection of 6500; a series of 1000 of the Rosenbusch typical rocks; 1975 specimens illustrating the formations of Michigan; and 4973 microscope slides of rocks.

Zoology. 800 specimens: chiefly invertebrates for use in instruction in classification, previous to work in paleontology.

Botany. 300 specimens of woods.

Ethnology. 250 specimens.

Michigan geological survey, Houghton. A. C. Lane, *state geologist* at Lansing, F. E. Wright at Houghton.

18,000 specimens: rocks gathered from different parts of the upper peninsula of Michigan by the survey corps, beginning with the administration of the late Charles E. Wright, in 1885, and augmented by the collections of private persons. The specimens previously collected by and under the different state geologists are now, in part, lodged in the University of Michigan at Ann Arbor. The collection of fossil corals made by former state geologist Rominger is at Ann Arbor, as is also considerable material from the lower peninsula collected by the late Dr Alexander Winchell, whose private collections are at Alma college.

Besides the collection of rocks, the survey possesses a small collection of copper and other ores and minerals from the vicinity of Houghton and a considerable number of suites representing deep drill holes in various parts of both peninsulas. These are in part at Lansing and in part at Houghton.

University of Michigan, Ann Arbor.

Historic geology and paleontology. 95,040 specimens, nearly all invertebrates: a large series from the geologic survey of the state, of which more than 100 are type specimens; the White collection of 1018 catalogue entries numbering 60,000 invertebrate fossils; the Rominger collection of 5000 species, 25,000 specimens, invertebrate fossils, which includes *a*) types of all Paleozoic corals described by Dr Rominger in the geologic report of Michigan, volume 3, *b*) stromatoporoids, *c*) bryozoans, *d*) Paleozoic fossils belonging to all other classes, *e*) a large number of European fossils of all ages and classes, the sponges of which form, with the American species, a very interesting series, and 250 species, 10,000 specimens of invertebrate fossils added by Dr Rominger; 40 Cretaceous and Tertiary fossils from Texas, specimens from Yellowstone park and 23 from the upper Missouri valley.

Mineralogy. 6000 specimens: the Lederer collection of 2500 minerals, principally European; rich series of Michigan minerals,

including all varieties of copper ores and associated minerals from the Lake Superior region.

Economic geology. A series of foreign and domestic building stones, deposited by the Smithsonian institution; a series illustrating the metalliferous regions of the upper peninsula of Michigan; 150 specimens of ores and rocks, deposited by the United States national museum; 39 of copper ore and associated rocks from the Wolverine copper mine; seven of native copper from the Calumet and Hecla mines; 25 of asphaltum and petroleum; samples of brine and salt from Percy's salt well, Mason county, Mich.

Physical geology and geography. A representative collection of volcanic products, including a series of specimens from Martinique and St Vincent; the deposit formed in caverns; chemical precipitates from lakes and springs; peat, lignite, coal, petroleum, asphalt etc.; meteorites, the products of rock weathering; soils etc. comprising several hundred specimens. Supplementing this collection and also used in illustrating lectures on physical geology and geography, are relief maps and models and a large number of lantern slides.

Zoology. A series illustrating the fauna of Michigan and other northern and western states; a collection of animals of the Pacific coast; many valuable specimens from the Philippine islands and other foreign countries; the Beal-Steere collection comprising numerous corals, shells, insects, birds and mammals from South America, China, Formosa, Philippines and the Moluccas.

Botany. 100,000 specimens representing 5000 species under 25,000 entries: large series of Michigan plants collected by the public surveys; several valuable herbariums and sets of plants, the most important of which are the Houghton herbarium, the Sager herbarium, the Ames herbarium, the Harrington herbarium, the Beal-Steere, the Adams-Jewett and the Garrigues collections; Collins's, Holden's and Setchell's Phycotheca Boreali-Americana; Briosi and Cavara's funghi parasiti; Seymour and Earle's economic fungi, the continuation of Ellis's

North American fungi and large additions to the cryptogamic flora of Michigan.

Archeology and ethnology. Beal-Steere collection of arms, implements, carpenters tools, musical instruments and idols of the Chinese; many articles domestic and warlike used by North American Indians and natives of the south Pacific islands; clothing of the American Indians, modern Peruvians, Formosans and natives of the East Indies and Alaska; casts from Europe and the Ohio mounds and pottery from the Cliff Dwellers of New Mexico and Arizona received from the Smithsonian institution; the valuable collection made by the late Daniel De Pue, mostly from Washtenaw county, Mich.; a fine collection of flint instruments from Denmark and an extensive collection of Peruvian burial pottery secured by the Beal-Steere expedition.

The Frederick Stearns collection of musical instruments consists of 1400 pieces (no duplicates) representing nearly all types of instruments of all nations and ages, collected with reference to its educational value as illustrating the evolution of the modern types.

The Chinese exhibit of the New Orleans cotton exposition illustrative of the culture and manufacture of cotton and its use in garments, native-made household furniture, and house and garden pottery.

MINNESOTA

Carleton college, Northfield. L. W. Chaney, *professor of biology,* in charge.

Paleontology. 12,000 specimens: Cambrian, Silurian and Coal Measures.

Mineralogy. 2000 specimens.

Zoology. 1000 specimens: for class use only.

Gustavus Adolphus college, St Peter. J. A. Edquist, *curator,* in charge.

Paleontology. 1000 specimens: general collection of 300 Silurian and Carboniferous; special collection representing Cretaceous and Jurassic flora and fauna of Laramie plains, Wyoming; left femur of Brontosaurus, 75 inches in length. Some material for exchange.

Mineralogy. 800 specimens: Smithsonian collection from different localities representing all the groups; general collection of carbonate minerals and ores being best represented. Some material for exchange.

Historic and economic geology and lithology. 1000 specimens: 200 stratigraphic specimens illustrating all the geologic formations; Smithsonian collection of 200 illustrating dynamic and structural geology; 300 general. Material for exchange.

Zoology. 1500 specimens: mounted mammals, birds and reptiles; alcoholic and histologic preparations; shells; 1000 entomologic specimens.

Botany. 5000 specimens: the Sandberg collection of Minnesota flora, 300 genera and 500 species; the Rundstrom collections of 250 genera, 350 species of American flora, and 375 genera, 800 species of Scandinavian flora. Material for exchange.

Ethnology and anthropology. 700 specimens: implements, weapons and ornaments of the American Indians; numismatic collection of silver, copper and bronze coins.

Hamline university museum of natural history, St Paul. The museum is a part of the department of biology and geology, of which Henry L. Osborn is director. Assistants are employed from time to time as needed.

Paleontology. 1000 specimens: including a general collection chiefly Paleozoic; the Lillibridge collection of fossils chiefly mollusks from the Black Hills Mesozoic, but including a few vertebrates of tertiary age; N. H. Winchell collection of Paleozoic fossils from the central states.

Mineralogy. Specimens chiefly from the Central states, the Lake Superior copper region being well represented; collections from Gouverneur N. Y.; the Yellowstone national park; and the collections of N. H. Winchell, H. L. Osborn, C. A. Waldo and F. W. Dewart.

Historic geology. 1000 specimens; a series collected by H. L. Osborn, illustrative of the glacial drift at Hamline; ores of iron and copper received from the United States national museum; a general lithologic collection made by N. H. Winchell, also one illustrating structural geology.

Zoology. 100 skins of mammals; 200 mounted birds, 400 skins of birds, and 500 birds nests and eggs; 100 articulated and 250 disarticulated skeletons; 200 alcoholic vertebrates; 100 fragile objects, vertebrate and invertebrate, in glass boxes for class use; 500 alcoholic invertebrates; 500 anatomic preparations; 1000 mounted insects; 350 dried invertebrates, exclusive of conchological specimens; 500 conchological specimens; 1000 histologic preparations; and 1500 microscope slides.

The more important donors to these collections are, the United States national museum, H. L. Osborn, the Menage scientific expedition, Otto Lugger and Eddy H. Greeley.

Botany. 3300 specimens: the H. L. Osborn collection of 2000 specimens from the northern and eastern parts of the United States; the F. W. Dewart collection of 300 specimens of the Yellowstone national park flora; the Merrill Hitchcock collection of 500 specimens of Vermont flora; collection of Mrs Thomas G. Lee of flowering plants, a collection of fungi and lichens; and a local herbarium of 500 specimens.

Ethnology. 200 specimens: from Liberia, Africa, donated by Rev. B. F. Kephart and Eddy H. Greely; 50 relics of the American Indians received from N. J. Lillibridge.

Minnesota academy of natural sciences, Minneapolis. Charles P. Berkey, *corresponding secretary.*

Paleontology. 1000 invertebrate fossils; 500 vertebrate.

Mineralogy. 2500 specimens.

Geology. 500 rich specimens.

Zoology. 100 mammals and reptiles, 100 reserve; 1100 birds (mounted), 3500 reserve; 500 corals; 1000 shells and miscellaneous specimens. Those marked reserve are not mounted and not on exhibition.

Ethnology. 1500 weapons, tools, clothing, etc.; 300 photographs from the orient. These with the specimens under zoology are almost exclusively from the Philippine islands and the collection is one of the most complete in the world.

In the library are 9291 publications of scientific societies.

Besides the above there are loaned to other neighboring museums large collections of certain groups not counted in the list.

Minnesota geological and natural history survey, Minneapolis, N. H. Winchell, *state geologist.*

Collections are in the custody of the University of Minnesota at Minneapolis and are described with the other collections of that university.

The geologic survey was concluded early in 1901. The publications remaining on hand were turned over to the general library of the University of Minnesota, William W. Folwell, librarian. Work in botany proceeds under the charge of Conway MacMillan and in zoology under Henry F. Nachtrieb, both of the same university.

University of Minnesota, Minneapolis. This institution has no distinctively university museum. It is however, charged with the care of the museum to be created by the geologic and natural history survey. The departments of zoology and botany have study collections which are not considered separate from the collections of the museum embraced under the geologic and natural history survey, and the heads of the departments are in charge of their respective collections. Conway MacMillan, *professor of botany;* C. W. Hall, *professor of geology and mineralogy;* Henry F. Nachtrieb, *professor of zoology.*

Paleontology. Geologic survey: over 9700 entries with many duplicates embracing 2000 fossils. For study, 2500 fossils and a fairly complete set of Ward's casts of fossils; the Sardeson collection of Paleozoic fossils which consists of a series of 32,500 specimens under 2500 entries. The collection of vertebrate fossils is begun, the anthropologic series number 300 entries.

Geology and mineralogy. Geologic survey; over 9700 entries with many duplicates embracing: 5700 rocks; 2000 minerals; 1500 thin sections of rocks and fossils; an extensive series of photographs and negatives representing geologic formations, physiographic features and microphotographs. Also for study 5000 rocks. 1400 thin sections of minerals and rocks; 6000 minerals, including the Kunz systematic collection; 2000 comprised in systematic collection; 3400 in reference collection; 1000 crystal forms; 2000 photographs; 500 negatives and several hun-

dred lantern slides. The collection of meteorites is one of high rank.

Zoology. 275,000 specimens: the reference and exhibition collections of dried and alcoholic specimens; entire and dissected specimens; sections, skeletons; models and skins; special collection of the birds, fishes, insects and mollusks of Minnesota.

The plan is to make the museum representative of the state and contemplates as full a representation of the entire fauna as possible, while extralimital material is added merely for completeness of illustration. The plan is to make the collection as complete as possible and afford facilities for students and investigators.

Botany. A herbarium of 325,000 dried specimens; 2000 jars of alcoholic and formalin material; 200 specimens of woods; 5000 plant portraits.

Minnesota species of Spermatophyta, Pteridophyta, Bryophyta, Algae, Fungi, and photographs of the same are always on hand for exchange. An exchange bureau is maintained, and the curator is in communication with hundreds of American and foreign collectors.

MISSISSIPPI

Millsaps college museum, Jackson. A. M. Muckenfuss, *professor of chemistry and physics*, in charge.

The collections are not large, and are used only for illustrative purposes. There is a small collection of local fossils.

Mississippi agricultural and mechanical college, Agricultural College. Glenn W. Herrick, *professor of biology*, in charge.

Historic and economic geology and lithology. 500 specimens.

Zoology. 10,000 specimens of insects; 70 specimens of invertebrates presented by the Smithsonian institution; a few fishes; fairly good collection of birds eggs.

Botany. A station (experiment) herbarium of 2000 phanerogams; a college herbarium of 2000 specimens; a station herbarium of 2000 fungi mostly parasitic.

University of Mississippi, museum of natural history and geology, University. Waller S. Leathers, *professor of natural history and geology*, in charge of museum.

Paleontology. Representative collection of invertebrates from the Cambrian formations upward; also sharks teeth; bones of mastodon, zeuglodon and other fossil vertebrates from the Tertiary and Pleistocene formations. A few zeuglodon vertebrae and fossiliferous concretions from Mazon creek, Illinois for exchange.

Mineralogy. A representative series of minerals, including most of the species described in Dana's *Manual.*

Economic geology. Collection made by the former state agricultural and geological survey, including rocks, soils (with many analyses of the same) and fossils of the state, arranged by counties, with some from adjoining states.

Lithology. A very fair collection, the basis of which was purchased from A. E. Foote of Philadelphia, and added to from time to time.

Zoology. Many mounted and alcoholic specimens; skeletons of vertebrates and dried invertebrates; shell collection of 10,000 varieties, purchased from Dr Francis H. Markoe.

Botany. An incomplete suite of cryptogamous plants.

Ethnology. Bones, pottery, fishhooks, arrowheads, etc., of the North American Indians and the Mound Builders.

MISSOURI

Bureau of geology and mines, Rolla. E. R. Buckley, *state geologist.* 8000 entries and 32,000 specimens illustrating the geology and mineral resources of the state exclusively.

Central college, Fayette. No report.

Christian university, Canton. No report.

Drury college, Springfield. Edward M. Shepard, *professor of geology*, in charge.

Paleontology. The collection consists of 400 specimens of Silurian, 100 Devonian, 1000 Lower Carboniferous, 500 Lower

Coal Measures, 500 Middle and Upper Coal Measures. Type specimens of Missouri Devonian fossils (*Missouri geological survey*, vol. 12, pl. 1).

Mineralogy. Tenney collection (Prof. Sanborn Tenney of Williams college) 400, Flanner collection (Dr T. U. Flanner, Michigan copper ores) 300, Missouri lead and zinc minerals 300. General collection of minerals 500.

Historic and economic geology and lithology. This collection consists of 500 specimens of Lower Carboniferous, 600 of lead and zinc minerals from all sources, Smithsonian national museum collection of rocks about 150. About 200 specimens of Tasmanian, Australian, New Zealand and Hawaiian rocks and ores.

Zoology. 200 specimens of West Indian corals and sponges; 150 specimens of the Smithsonian collection of marine invertebrates; 100 specimens of Hawaiian corals; 100 specimens of New Zealand shells; 200 specimens of Greene county (Mo.) reptiles and birds; 100 specimens of marine fishes of the Atlantic coast and the West Indies. General collection of 500 shells.

Botany. Herbarium of Greene county (Mo.) flora consisting of 600 species; herbarium of New England flora of 700 species; herbarium of 150 species of carices and grasses of United States; herbarium of 105 species of Hawaiian ferns; herbarium of 200 species of marine algae; hebarium of 200 species of fresh-water algae.

Ethnology. This collection consists of South African, Fijian and Hawaiian curios.

Prichett college museum, Glasgow. W. Newton Holmes, *professor of science*, in charge.

Palcontology. 10,000 specimens: Silurian system, 500 fossils; Carboniferous system, 5000 fossils, the brachiopods and crinoids of the Subcarboniferous being best represented; Devonian system, 200 fossils; Cretaceous formations of Texas, 1000 fossils, the Ostrea family being the best represented; some bones of a mastodon. 3000 duplicates for exchange.

Mineralogy. 2000 specimens: ores of silver, lead, and iron best represented; ores of tin, zinc, mercury and manganese; quartz, stalactites, etc., well represented. 500 duplicates for exchange.

Zoology. 800 specimens: mounted mammals and birds; alcoholic specimens; skeletons; shells, etc.; 100 specimens native birds; 400 alcoholic specimens of marine invertebrates. 200 duplicates for exchange.

Botany. A herbarium of 500 native plants, chiefly those flowering in the spring and early summer.

Ethnology. 250 specimens: polished stone axes; hatchets (one hematite hatchet); discoid stone; a few pieces of pottery and about 100 arrowheads, all relics of American Indians; a few specimens of bones of Mound Builders.

University of Missouri, school of mines and metallurgy, Rolla. George E. Ladd, *director.*

Paleontology. A student collection of 500 specimens.

Mineralogy. Working collection for blowpiping, etc. 3000 to 4000 specimens; working collection in cabinet, 1000 specimens; exhibition collection 2000 specimens. Several thousand specimens from the Joplin district, Missouri, for exchange.

Historic and economic geology and lithology. 3500 specimens.

University of the state of Missouri, university museum, Columbia. The staff of the museum includes the following professors in charge of their respective collections: George Lefevre, *zoology;* C. F. Marbut, *geology and mineralogy;* F. B. Mumford, *agriculture;* J. M. Stedman, *entomology.*

Paleontology. 1500 specimens: a general collection, representing particularly well the brachiopods of the Coal Measures; the Winner collection, including the fossil fauna of Kansas City and vicinity, and the Blair collection of mastodon remains. In 1892 fire destroyed a number of Swallow's type specimens of fossils.

Mineralogy. 1500 specimens: general but specially rich in calcite, dolomite, sphalerite, galenite, and chalcopyrite from Joplin Mo.

Lithology. 2000 specimens: a series illustrating Rosenbusch's classification of rocks; collections illustrating the geology of Baltimore Md., the Lake Superior region, the Green mountains and Missouri.

Zoology. Collections of Missouri mammals, birds, reptiles, amphibians and fishes; Ward's specimens of mammals and birds, illustrative of the principal groups; specially large collection of Astacidae from the United States; collections of marine invertebrates.

Entomology. Large Missouri collections including the remains of the original collections of C. V. Riley's *Missouri reports* and the Stedman collection. Some Missouri specimens for exchange.

Botany. A complete herbarium of the flora of Missouri and some exotics; special collections of fungi, grasses and trees of commercial value. Some Missouri specimens for exchange.

Anthropology. Skeletal, and other remains of the mound builders from Boone county, Mo., and numerous Indian relics from other parts of the state.

There is also an extensive museum of agriculture in connection with the university.

Washington university museum, St Louis. G. Hambach, *professor of geology,* in charge.

Palcontology. 40,000 specimens giving a fair representation of all geologic formations; the Shumard collection; flora of the Carboniferous, Cretaceous and Tertiary systems. No duplicates for exchange.

Mineralogy. 1000 representative specimens.

Historic geology and lithology. 2000 specimens.

Zoology. 15,000 specimens representing all classes of the animal kingdom.

Westminster college, Springfield. No report.

MONTANA

College of Montana, Deer Lodge. No report.

Montana college of agriculture and mechanic arts, Bozeman. F. W. Traphagen, *professor of mineralogy and geology;* R. A. Cooley, *professor of zoology and entomology;* J. W. Blankinship, *professor of botany.*

Paleontology. 2000 specimens representing all geologic ages specially Upper and Lower Silurian, Tertiary and Miocene. Specimens of Lower Silurian brachiopods and Upper Silurian trilobites, and Montana Middle Cambrian and Cretaceous for exchange.

Mineralogy. 5000 specimens of Montana gold, silver, copper and lead ores; metallic minerals and their associates. Specimens of chalcocite, bornite, stephanite, bismuthinite, vanadinite, asphaltum, corundum, enargite, unusually fine goslarite and hyalite for exchange.

Historic and economic geology. 500 specimens: an educational series of rocks; Judith mountain series; Montana rocks generally; 113 Voight and Hochgesang oriented sections of rock-forming minerals. Montana metamorphics and eruptives for exchange.

Zoology. 3500 species, 7000 specimens: representative animals used in demonstration before classes, and Montana vertebrates (particularly birds) and insects. Specimens of birds and insects for exchange.

Botany. Herbarium of 6000 mounted specimens and as many more unmounted; several specimens of fungi, seeds, cones, etc. in trays for exhibition purposes, and 40 specimens of the native woods of the state. Specimens for exchange.

NEBRASKA

Creighton university museum, Omaha. William F. Rigge in charge.

The museum includes altogether 10,000 specimens, arranged for use in instructing students and including representative and characteristic rather than rare specimens.

Mineralogy. 500 labeled and classified specimens, and as many more unclassified.

Doane college biological and geological museum, Crete. D. B. Perry, *president*, in charge.

Paleontology. 350 specimens, mostly from the Silurian rocks, but covering nearly all geologic periods.

Mineralogy. 600 specimens.

Zoology. 250 specimens of mammals and birds; 200 fishes, amphibians and reptiles; 500 shells; and 200 marine and freshwater invertebrates.

Botany. 2500 specimens: chiefly illustrative of Nebraska phanerogams, but represent forms from other states and Europe.

Ethnology. 150 specimens of implements, utensils, etc., of the American Indians and of African tribes.

Nebraska Wesleyan university, University Place. No report.

University of Nebraska state museum, Lincoln. Erwin H. Barbour, *acting state geologist*, curator.

Owing to lack of available space for exhibition purposes, the museum is not at present well arranged. Some valuable collections, chiefly of geologic and paleontologic material, have been obtained by class excursions from the university. 35,000 specimens have been added during the past three years by the state geological survey, being obtained chiefly from the Carboniferous and Dakota Cretaceous of Nebraska and surrounding states.

The archeologic, ethnologic, paleontologic and forestry collections are valued at $50,000. Among the geologic material is a set of specimens of the core of a test well some 2500 feet in depth, bored near Lincoln.

The present museum is so overcrowded that arrangements have been made to store everything in fireproof buildings down town till a new museum can be built.

NEVADA

State university, Reno. No report.

NEW HAMPSHIRE

Dartmouth college, Butterfield museum, Hanover. The collections are in charge of the heads of the respective departments: C. H. Hitchcock, *geology, curator of museum;* William Patten, *zoology;* and G. R. Lyman, *botany.*

Paleontology. Collections are mostly incorporated with those illustrating historic geology. They include one of the James

Hall collections of New York fossils, obtained from the American museum of natural history; several large slabs of ichnites from the Connecticut valley; and several of Ward's casts of large vertebrate fossils.

Mineralogy. About 2000 specimens representing nearly 300 species and varieties and including the Frederick Hall collection. New England localities are best represented.

Historic geology. 4000 specimens: fossils and rocks, illustrating formations all over the United States, but particularly those of Connecticut, New York, Ohio, Indiana, Illinois, Iowa, Minnesota, Missouri, Kansas, Alabama and Colorado. 25 relief maps, one of New Hampshire and Vermont on a scale of 1 mile to an inch, and colored geologically. The sections are arranged geographically and are accompanied by colored geologic profiles to illustrate the relations of the several formations.

Economic geology. 2500 specimens: a collection of 1500, illustrating the occurrence of gold and silver ores in Montana, specially rich in the silver ores of the Cordilleras; marbles, slates and granites of New Hampshire and Vermont; and a series of petroleum specimens representing 100 localities.

Lithology. 11,700 specimens: volcanic rocks from Vesuvius and the Hawaiian volcanos, 350; massive igneous rocks of general distribution, 200; a special collection from the New Hampshire geological survey, collected to illustrate the survey reports, 250; a general collection of New Hampshire and Vermont rocks, 3500; a special collection from the White mountains, 1000; from the Ammonoosuc district, 1100; a series from the vicinity of Hanover N. H. 500; a series from the vicinities of Vernon N. H. and Bernardston Mass. 200; a set illustrating the geology of 16 sections crossing New Hampshire and Vermont, 3000; a collection of drift boulders illustrating the distribution of drift material in New England, 1500. They have been partially described in the New Hampshire reports and in bulletins of the American museum of natural history. Most of them are the official collections of the New Hampshire state geological survey.

Zoology. A collection of well mounted birds of the vicinity of Hanover, together with their nests and eggs; a collection of fishes from the United States; 2000 species of shells (mollusks) gathered by Prof. C. H. Hitchcock; 1000 species of New Hampshire insects mounted in pairs; a miscellaneous collection of about 1000 invertebrate specimens; and a large quantity of biologic preparations for use in laboratory work.

Botany. A general herbarium of 5000 species gathered by Prof. C. H. Hitchcock, and rich in ferns and marine algae; 1000 specimens of wood sections, seeds, etc., and many mosses and hepaticae; by donation from Prof. Trelease several thousand species, phanerogams and ferns, and by donation the herbarium of Prof. H. G. Jesup.

Ethnology and archeology. 500 aboriginal implements from Lake Winnipiseogee, and other localities; 90 skulls and pieces of pottery of the Mound Builders; 400 ethnologic specimens from Zululand, Alaska and the South Sea islands; many photographs of American Indians, and a full sized figure made by the Smithsonian institution, of Chief Joseph; a few Roman antiquities; a collection of Burmese and Japanese antiquities, and eight or nine unusually fine sculptures from Nineveh, obtained by Dr Wright about 1860.

The handsome museum building is the gift of the late Ralph Butterfield M.D. of Kansas City.

Keene high school museum, Keene. Percy S. Brayton, *submaster of the school*, curator.

Paleontology. 150 specimens of corals, mollusks and fishes, from the western states.

Mineralogy. 2000 specimens for class use.

Historic and economic geology and lithology. Collections very small.

Zoology. 3000 specimens: mounted mammals and birds; skulls and skeletons; shells and insects; and small collections of corals and reptiles.

Botany. 500 specimens illustrating the flowering plants and the ferns of New Hampshire.

Ethnology. 500 specimens: relics of the local tribes of American Indians including articles of clothing, arrow points, pestles, knives, etc.

Keene natural history society, Keene. George A. Wheelock, *president.*

The geologic collection of 1000 specimens is not systematic, but consists of miscellaneous local material. It answers well the needs of the high school teachers who have charge of it, and for whose benefit it is intended. There are also biologic collections.

New Hampshire college of agriculture and the mechanic arts, Durham. Clarence M. Weed, *professor of zoology and entomology;* Charles L. Parsons, *professor of chemistry and mineralogy.*

Geology. A set of the rocks of the state; a good sized reference collection of minerals; a relief map of New Hampshire and Vermont and a few corals and miscellaneous specimens.

NEW JERSEY

New Jersey geological survey, Henry B. Kümmel, *state geologist.*

The collections made by this department are in the custody of the New Jersey state museum and are described with the other collections of that museum.

New Jersey state museum, Trenton. Commissioners: state sup't of public instruction, Charles J. Baxter, *president;* state geologist, H. B. Kümmel, *secretary;* pres. state board agriculture, E. B. Voorhees; president of the state senate; speaker of the assembly; S. R. Morse.

Paleontology. Several thousand specimens representing Cambrian, Ordovician, Silurian, Lower Devonian, Triassic, Cretaceous and Tertiary. For type specimens see Whitfield's *United States monograph on Brachiopoda, Lamellibranchiata, Gastropoda and Cephalopoda of the Raritan clays and the greensand marls.*

Historic and economic geology and lithology. 3000 specimens: iron ores; zinc; clays; green sand marls, etc.

Mineralogy. 1500 specimens. Synoptic collection of minerals of the state.

Zoology. 325 specimens: birds and mammals with nests and eggs. Also a collection of insects injurious to forests, prepared by Dr John B. Smith of Rutgers college for exhibition at the Pan-American exposition.

Botany. Collection kept at Rutgers college. A new collection of New Jersey woods is being made, which contains now 100 specimens intended as an educational exhibit. It includes the leaves, flowers and fruit of the trees.

Ethnology and anthropology. A small collection of Indian relics.

Princeton university museums, Princeton. William Libbey, *professor of physical geography and director of the E. M. museum of geology and archeology;* Arnold E. Ortmann, *curator of invertebrate paleontology;* Marcus S. Farr, *curator of vertebrate paleontology;* Henry B. Cornwall, *professor of applied chemistry and mineralogy and director of mineralogical cabinet;* Alexander H. Phillips, *assistant professor of mineralogy;* George Macloskie, *professor of biology and director of the John C. Green school of science, biological museum;* Walter M. Rankin, *assistant professor of biology and curator of the zoological museum;* Allan Marquand, *professor of archeology and history of art and director of the museum of historic art.*

Paleontology. 15,000 species: skeletons of a mastodon, Irish elk, cave bear and some of the extinct birds of New Zealand; a skull of the Uintatherium and a remarkably complete skeleton of Cervalces; mounted casts of the gigantic reptiles and mammals of the Secondary, Tertiary and Quaternary ages; a very perfect collection of vertebrate and invertebrate fossils from Europe and America illustrating the principal organic forms of all the geologic epochs; fine Eocene, Oligocene and Miocene fossils, many of which are type specimens, procured in the west by the various collecting parties from the university; a series of fossil plants from Colorado, many of which are type specimens. The typical fossils selected agree, so far as possible, with those mentioned in Dana's *Geology* as characteristic of different geologic periods.

One of the most important collections in the geological museum is that made by the expeditions to Patagonia conducted by J. B. Hatcher in 1896-99. This consists of a very extensive series of Cretaceous and Tertiary invertebrates, including a large number of types of new genera and species, and of about 2000 mammals from the Patagonian and Santa Cruzian (Miocene) beds.

The mammals are remarkable not only for their variety, but also for their state of preservation, very many complete or nearly complete skeletons, representative of all the orders, being among them.

These collections form the subject of the forthcoming *Reports of the Princeton university expeditions to Patagonia*, now in course of publication.

Mineralogy. About 10,000 specimens. 2600 specimens: mostly crystals, bequeathed to the university by the late Archibald MacMartin of New York. The perfection of the specimens and the number of localities represented by each species make this collection one of special value.

There are also three cabinets of minerals in the laboratory of the school of science. The principal one contains over 5000 specimens, embracing nearly every mineral species. Two smaller cabinets, one with labeled and the other with unlabeled minerals, are provided for practice with the classes, and to these the students have free access.

A very fine collection of New Jersey zinc and iron minerals from the Sterling mines was recently presented to the university, and is exhibited in the main laboratory.

Historic geology. A unique collection of 5000 specimens of erratic boulders and drift material from Switzerland; a systematic series of the typical rocks and fossils of New Jersey; and one of the typical rocks of New York representing the series as described by the geologic survey of that state. The geologic collections are all arranged with a special view to the purposes of comparative study.

Lithology. In the laboratory of the school of science are 240 specimens of typical rocks, together with a large number of Fuess's and other rock sections for study.

Zoology. 1600 mounted and disarticulated skeletons of mammals, birds, reptiles and fishes. There are over 12,000 specimens in the ornithologic collections starting with a mounted collection of representative New Jersey birds. The relations of these to the avifauna of the world is shown by collections of unmounted skins in the following groups: North America, Europe, Indo-Australia and South America. The South American collection has been materially augmented through the work done by the Hatcher expeditions to Patagonia, the results being some 600 birds. The collections are further supplemented by some four thousand sets of eggs, many of them in nests, as well as much alcoholic material and many skeletons. 2000 European and Asiatic birds have recently been received through exchange with the British museum of natural history. Mr W. E. D. Scott is curator of ornithology.

Among the invertebrates are a series of ascidians, echinoderms, mollusks, 5000 specimens; corals, 6000 specimens; sponges and microscopic preparations of small forms. 1500 preparations illustrating comparative morphology of the vertebrate organs.

Botany. Collections are arranged for exhibition and also as a working laboratory for students. The plants are classified according to the *Pflanzenfamilien* of Engler & Prantl and include specimens from the different sections of the United States and from South America, Europe and Australia. Recently the herbarium has been increased by the addition of collections of hepaticae, mosses and other plants, made by Dr Hatcher in western Patagonia and Fuegia.

There are extra specimens for laboratory use and for dissection, together with the necessary library and instruments.

Archeology and ethnology. Relics of the Swiss lake dwellings and numerous implements of stone and bronze from Denmark;

several hundred flint instruments from most of the classic localities of the Paleolithic and Neolithic ages of France; pottery and human remains of the Mound Builders; several hundred specimens of Mexican and Peruvian pottery and a number of recent Indian relics; interesting ethnologic collections of objects, chiefly from Alaska and New Mexico, presented by Dr Sheldon Jackson to the theologic seminary of Princeton and transferred to this museum by the trustees of that institution, with the consent of the donor; a series of models of the cliff dwellings and pueblos of the southwest, executed under the direction of Dr Hayden.

There is also a museum of historic art containing collections illustrative of the history and processes of the graphic arts; reproductions of Greek and Roman coins and gems; specimens of Greek and Roman marble; a collection of bronze medals; casts of ivories from the Roman to the Gothic period. A series of casts from the arch of Trajan at Beneventum has been recently added.

The Trumbull-Prime collection, illustrative of the history of pottery and porcelain, has been arranged in new cases. Egypt is represented by sepulchral figurines, beads and amulets; Phenicia by numerous Cypriote vases; Greece, Etruria and southern Italy by Corinthian aryballi and fine examples of larger vases of black figured and red figured types. The Orient is further illustrated by specimens from Persia, China and Japan; South America by Peruvian pottery. The collection is rich in examples of European wares, to which England, France, Germany and Holland are the chief contributors, but Italy, Russia, Sweden and Switzerland are also represented. The collection comprises about 20,000 specimens. A small room in the same story contains a collection of pottery loaned by Mrs W. S. Livingston and is noteworthy for the illustrative material it furnishes for the early history of our country.

The staircase and basement are occupied by carefully selected specimens of casts of ancient and medieval sculpture, presented by the class of 1881 at its decennial. This collection was formed to illustrate the history of ancient sculpture in Egypt, Babylon

and Assyria, Persia, Greece and Rome and of medieval sculpture in Italy, France and Germany. There has been recently added from the same fund a collection of casts of renaissance sculpture.

Rutgers college, The George H. Cook museum of geology, New Brunswick. Albert H. Chester, *professor of mineralogy and chemistry, curator*, assisted by W. S. Valiant.

Paleontology. 5750 specimens divided among the various geologic systems as follows: Lower Silurian, including fossils from the earlier formations and a fine lot of trilobites, with appendaged Triarthrus becki from Rome N. Y. 300; Upper Silurian, 400; Devonian, 450; Carboniferous plant remains mostly from Pennsylvania, Germany and Nova Scotia, 300; animal remains, 300; Triassic, 75; Jurassic, 525, mostly from foreign localities; Cretaceous, 2500, mostly from New Jersey; Tertiary, 1000; Quaternary, 500.

A great many of the type specimens used by Prof. R. P. Whitfield in his report on the fossils of the clays and marls of New Jersey are in this museum.

Some of the more prominent fossils in the museum are the Mannington (N. J.) mastodon; the original of the eurypterid Stylonurus excelsior, of the Devonian; saurian remains from the Cretaceous formations of New Jersey; and a slab of Jura-Triassic sandstone from Morris county, N. J., showing footprints of 15 species of dinosaurians.

Mineralogy. 11,700 specimens: the George H. Cook collection of 4500 specimens, with a large showing of New Jersey minerals—specially from the Franklin zinc mines, and the various trap rock quarries through the state; the Lewis C. Beck collection of 3000 specimens, mostly collected in New York from 1830 to 1850; Prof. A. H. Chester's private collection of 4550 specimens, one of the finest private collections in the country, is in the laboratory for use in teaching.

Many duplicates for exchange.

Geology. 1500 specimens: basaltic columns, large rock masses, geodes, concretions, fulgurites, ripple and rain markings, mud cracks, glacial striae, etc.

Historic and economic geology. 1100 specimens: illustrating the rocks, iron and zinc ores, clays, sands, marls (including the fossil bones and shells found in them) of New Jersey; a core from a diamond drill showing a section of the rocks at the Franklin zinc mines 1378 feet in depth.

Duplicates for exchange.

Zoology. Working collections in general zoology, entomology, etc.; a right whale caught in the Raritan river; a giant crab from Japan; recent ganoid fishes; and 1550 specimens of recent mollusks.

The zoologic collections, and those of botany, agriculture, art, engineering, etc., are in their respective departments, and not open regularly to the public.

Ethnology. 1700 Paleolithic and Neolithic implements, known as the "J. H. Frazee collection", that are exhibited with the geologic material.

NEW MEXICO

New Mexico college of agriculture and mechanic arts, Mesilla Park. E. O. Wooton, *professor of biology and botanist of experiment station,* in charge.

Paleontology. 200 specimens: small and general, belonging to the biologist.

Mineralogy. 500 specimens: United States geological survey educational series of rocks; unclassified New Mexican material.

Zoology. 150 specimens: a few for demonstrative purposes; a large collection of insects containing types of recently described species, and particularly rich in scale insects of the world and New Mexico bees.

Botany. 4500 specimens, mostly New Mexican: herbarium of the experiment station and biologist's private herbarium; 25 types of Wooton's species and cotypes of Greene, Heller, and Aven Nelson; and F. S. Earle's recently named species. Local New Mexican flora for exchange.

NEW YORK

Alfred university museum, Alfred. E. S. Babcock, *professor of chemistry*, in charge of the mineral collections. The other collections are in charge of A. R. Crandall, *professor of natural history.*

Paleontology. 1500 fossil species, chiefly Paleozoic, illustrated by 10,000 specimens: the type collection of the Allen museum, including Mesozoic and Cenozoic fossils not yet fully arranged.

The collection is rich in fossil sponges from the Devonian formations, but poor in primordial forms.

Duplicates of fossil sponges and of the more common forms for exchange.

Mineralogy. Gold, silver, copper and other ores, illustrated by 600 specimens; a general collection of 1000 specimens of minerals, representing 260 species and varieties.

Historic geology and lithology. Collections illustrate New York formations, and partially the terranes of some other states. Duplicates of local rocks for exchange.

Zoology. 20,000 specimens: a few mounted mammals; mounted skins of 122 species of the local birds, with their nests and eggs; 2000 species of insects, not well preserved; 1000 specimens of marine mollusks; 500 univalves and other shells and 200 Unionidae.

A few birds, and many Unionidae and marine shells for exchange.

Botany. The department herbarium of 6000 specimens, illustrating 1200 species; a collection of the local woods in the Allen museum. Specimens of the local flora for exchange.

Ethnology. Collections of the Allen museum amounting to 5000 specimens: weapons, implements, ornaments, etc., of the American Indians; a collection of 1436 coins, one third of which are of ancient, the remainder being of modern nations; pottery and illustrations of the ceramic and other industrial arts, ancient and modern; also household belongings and objects relating to social and religious customs of various peoples.

Material of the local tribes of American Indians for exchange.

American museum of natural history, Central park, New York. Morris K. Jesup, *president;* Hermon C. Bumpus, *director;* John H. Winser, *secretary and assistant treasurer;* Albert S. Bickmore, *curator of the department of public instruction;* R. P. Whitfield, *curator of geology and invertebrate paleontology,* Edmund O. Hovey, *associate;* L. P. Gratacap, *curator of mineralogy and in charge of conchology;* Henry Fairfield Osborn, *curator of vertebrate paleontology,* W. D. Matthew and O. P. Hay, *assistants;* J. A. Allen, *curator of mammalogy and ornithology,* Frank M. Chapman, *associate;* Frederic W. Putnam, *curator of anthropology;* Franz Boas, *curator of ethnology;* Marshall H. Saville, *curator of Mexican and Central American archeology,* Harlan I. Smith, *assistant curator;* William Beutenmüller, *curator of entomology;* A. Woodward, *librarian.*

Geology and paleontology. INVERTEBRATE PALEONTOLOGY. 8000 type and figured specimens. Most of these are in the James Hall collection of geologic and paleontologic material based on the New York state natural history publications, illustrative of the paleontology of the New York system and consisting of a general collection of a large proportion of the invertebrate forms illustrated in those volumes; and also specimens of the fish remains of the same geologic formations both in New York and from the other states and Canada, where the same geologic formations are known.

The Holmes collection of fossils, illustrated in Tuomey and Holmes's *Pliocene and post-Pliocene fossils of South Carolina;* the type series of the minute fossils of the Spergen hill beds, Ind., which are figured and redescribed in volume 1 of the museum bulletin, and again in the 12th annual report of the Indiana geological survey; most of the specimens illustrated in the state cabinet reports; all the types of fossils illustrated in the bulletin of the museum, consisting of many rare and unique forms, including fossils from Lake Champlain and the surrounding regions; a very extensive collection of Cretaceous fossils from Jamaica W. I., containing many rare and peculiar forms of Rudistae, etc.; a very large and nearly complete collection of

the Cretaceous fossils from Syria, including the Mt Lebanon district; trilobites from the Potsdam sandstones of Wisconsin, figured and described in the 16th report of the state cabinet; a series of Niagara group fossils from Waldron Ind., illustrated in the 28th report of the state cabinet; the type series of eurypterids from the Waterlime beds of Waterville, Williamsville and East Buffalo N. Y.; also the specimen of fossil scorpion from the same formation, described in the bulletin of the museum by R. P. Whitfield. This array of type material of invertebrate fossils brought together in one collection and in one room far exceeds that of any other collection known.

The department exhibits collections illustrating the geology and paleontology of Iowa and Wisconsin as given in the geologic reports of those states, with geologic specimens showing the grouping of fossils in the rocks and the lithologic and phenomenal features; a typical series of the bryozoans of the Cincinnati beds, described, determined and labeled by E. O. Ulrich; a large collection of fossil fishes from the Green river and Twin creek Tertiary beds of Wyoming; many from the Jurassic slates of Solenhofen, Bavaria; and a large collection of Devonian fossil fishes from the Portage shales of Lorain county, O. presented by W. E. Dodge. There is also a collection of fossil fishes of the Jura-Trias beds of the Connecticut valley and Boonton N. J., and a general collection of fossils from various European countries, from different sources, largely from Prof. Karl von Zittel and Prof. Lindström, containing a typical series of the fossil plants from Oeningen, identified and labeled by Prof. Heer; a collection of Devonian fossil plants obtained by exchange from Sir William Dawson; an interesting and instructive series of fossil cycad trunks from Dakota, and a series of fossil gums from Demarara, Zanzibar etc., inclosing leaves, insects, arachnoids, etc.

VERTEBRATE PALEONTOLOGY. *A* The Cope collection of fossil mammals of North America gathered by the late Prof. Cope between 1870 and 1890, and presented to the museum by trustees and friends in 1895 and 1900. It contains 500 types and 1000

figured specimens in a total of 9000: types of nearly all the species described by Prof. Cope, except of those collected by the Wheeler survey and now in the national museum.

B Fossil mammals collected by American museum expeditions 1891–1901 in the ancient lake basins of the west, specially those of Tertiary age: all types of species described, and specimens figured in American museum bulletins. Only a part has yet been prepared for exhibition.

C Fossil reptiles collected in the western Jurassic, Cretaceous and Tertiary beds by American museum expeditions. Not yet on exhibition.

D Exchange collections from European museums, Munich, Oxford, Paris, London, Stuttgart and Leipzig.

E Pampean collection by Ameghino and others purchased by Prof. Cope in Paris, 1878, and sold by him to the American museum in 1900.

F Other specimens presented by friends or purchased by the museum.

Specially noteworthy features of the exhibits are: Series showing the evolution of the horse, rhinoceros, titanothere, amblypod, sloth, tapir and other western American types; complete mounted skeletons of Titanotherium, Palaeosyops, Hyracotherium (the four-toed horse), Coryphodon, Hoplophoneus (a saber-tooth tiger), Aceratherium, Metamynodon and Hyrachyus (the three American types of rhinoceros), Phenacodus and Euprotogonia (primitive ungulate types), mastodon, Irish elk, and numerous others not yet ready for exhibition; fine series of complete skulls of uintatheres (Dinoceras), titanotheres, American rhinoceroses, etc.; the Mesozoic Mammalia or multituberculates and early American primates, primitive ungulates and carnivores.

The specimens not placed on exhibition are intended for use as study collections, and are fully labeled and arranged so as to be most easily accessible to students.

Mineralogy. The famous Bement collection, with which is incorporated the reserve series; the Tiffany gem collection, now

known as the Morgan gift, separately installed; a collection of 500 meteorites, representing 450 falls with two large Greenland irons brought back by Lieut. Peary; massive specimens of Bisbee copper ores with several stalactites delicately colored by blue and green copper carbonates, and a fine series of wall case specimens extending over 1500 running feet of shelves. There is in connection with certain of the collections an introductory series embracing a group of photographs of mineral localities.

Historic geology. Besides those mentioned with paleontologic material are: a series of fossils illustrating two thirds of the species in Dana's *Manual of geology*, 3d edition, three fourths being the original specimens figured; a series of rocks collected by Prof. C. H. Hitchcock, illustrating the lithologic features of the White mountain ranges and a series illustrating 12 sections across New Hampshire and Vermont, collected and labeled by the author of the reports on the geology of those states; rocks and fossils illustrating the geology of the Island of Yesso, Japan, from the Japanese governmental survey.

Economic geology. 1000 different samples, cut uniformly with one face polished, of building and ornamental stones of the United States.

Zoology. MAMMALS. 1000 mounted specimens, about 16,000 skins, and nearly the same number of skulls and skeletons. The exhibition collection includes a special series of groups illustrating the species found within 50 miles of New York city, and also several of the larger mammals of North America, as the bison, moose etc.

BIRDS. 65,000 specimens, of which about 12,000 are mounted and on exhibition, and about 50 groups of North American birds mounted to show their nesting habits with facsimile reproductions of their natural surroundings. The bird collection includes a large number of skeletons and many nests and eggs.

REPTILES, BATRACHIANS, AND FISHES. The collections of lower vertebrates are large and exhaustive, but at present only a few examples are on exhibition.

INSECTS. Between 350,000 and 400,000 specimens from all parts of the world. It is particularly rich in the Lepidoptera

and the Coleoptera, represented by large suites of specimens showing the variation and intergradation of the species. Contains many type specimens and valuable uniques. The exhibition collection is represented by many thousand specimens, viz, insects found within 50 miles of New York city; a general collection of beetles; a collection showing insect architecture and mimicry; an economic collection and collections of butterflies of the world.

INVERTEBRATES. An exceedingly valuable collection of corals is temporarily installed in Mineral hall. Other collections of invertebrates have been placed in various portions of the building till a suitable exhibition hall has been provided.

SHELLS. The John Jay (Wolfe memorial) collection with which is incorporated the great William Haines cabinet, the D. Jackson Steward collection, and the Binney and Bland collection of American land shells; all arranged and displayed with illustrative maps, figures and photographs.

Botany. The Jesup collection of woods presents a complete series of sections of the trees of North America. These sections are so cut and prepared as to show the adaptability of the various kinds of woods for various uses in the arts, and they are accompanied by illustrations colored by hand, which show the plants in flower and fruit.

Anthropology. Contains specially rich ethnologic collections from the North Pacific coast of America and from the Eskimo regions of Greenland, Hudson bay, and Alaska; ethnologic exhibits from the United States, Mexico, Eastern Siberia, China, Japan, Polynesia, and Africa; archeologic collections from various parts of the United States and Canada; a specially important exhibit from Mexico and Central America, of value in the study of symbols and hieroglyphs; also collections of pottery and objects of jadeite and copper; large groups of specimens illustrating the ancient cultures of the West Indies, Colombia, Peru, Bolivia, and Europe; and the Andrew Ellicott Douglass collection illustrating the forms of prehistoric implements in the United States and other countries.

Library. The library, formed principally through large and generous donations, contains 54,050 volumes and a large number of pamphlets and maps. These include works on the various branches of natural science, viz, anthropology, archeology, ethnology, conchology, entomology, ornithology, mammalogy, ichthyology, herpetology, botany, anatomy, geology, paleontology, mineralogy, agriculture, general zoology, voyages and travels and history relating to natural science. The periodicals and serials in the library have been obtained largely through the exchange of the museum annual reports, bulletins and memoirs.

Binghamton academy of sciences, Binghamton. N. M. Pierce, *president.*

This society owns several collections, but owing to the need of exhibition rooms, the material is not classified or arranged for reference.

Brooklyn institute of arts and sciences museum, Brooklyn. Franklin W. Hooper, *director;* William H. Goodyear, *curator of fine arts;* Alfred G. Mayer, *curator of natural sciences;* John S. McKay, *curator of physical sciences;* George K. Cherrie, *curator of ornithology;* Jacob Doll, *curator of entomology;* Carl Schaeffer, *assistant curator of entomology;* Abel J. Grout, *curator of botany;* Susan A. Hutchinson, *department librarian.*

Paleontology. The Gebhard collection of 7000 fossils representing all the formations of Schoharie county; the Eugene G. Blackford collection of fossil fishes; the Frederick Braun collection (loan) of fossils, and minerals, 2000 specimens and a general collection in paleontology.

Mineralogy. A general collection of more than 3000 specimens.

Lithology. Collections of European plutonic rocks and of the rocks of New York city and vicinity.

Entomology. The Berthold Neumoegen collection of Lepidoptera, numbering more than 50,000 specimens; the Edward L. Graef collection of Lepidoptera, numbering more than 20,000 specimens; the Jacob Doll collection (loan) of Lepidoptera, numbering more than 40,000 specimens; and the Calverly collection

of Coleoptera and Lepidoptera, numbering more than 20,000 specimens.

Conchology. A general collection of more than 12,000 specimens.

Ornithology. A general collection of 1200 mounted birds and bird skins.

General zoology. A collection of mammals, reptiles and fishes and invertebrates, estimated at 15,000 specimens.

Botany. A collection of mounted specimens of flowering plants numbering 40,000 specimens including collections presented by William Calverly, the late Rev. Charles H. Hall D.D. and the late Rev. George D. Hulst Ph.D.

Ethnology and archeology. The William Wallace Tooker collection of 8000 Indian relics of Long Island. The Charles A. Schieren collection of pottery from the cliff dwellers and Pueblos of the southwest. The Sturgis collection (loan) of implements from the South Sea islands. The C. W. Riggs collection of pottery from the ancient Pueblos of New Mexico and Arizona. Also collections from the Swiss lake dwellers, from the mounds of the Mississippi Valley, Mexico and Peru.

Geography. Geographic collection, comprising more than 4000 maps, charts, cartoons, globes, models, atlases and other apparatus and publications.

Fine arts. The Tissot collection of 450 pictures illustrating the life of Christ. A collection of paintings presented to the institute, and a loan collection of paintings. A collection of casts representing Greek and Greco-Roman sculpture. 6000 photographs illustrating the history of art. Also collections of engravings, etchings and coins. The Robert B. Woodward collection of ancient glass, mainly from Syria. Collections of Japanese pottery and articles of virtu.

Buffalo society of natural sciences museum and library, Library building, Buffalo. Elizabeth J. Letson, *director;* Lee H. Smith, *president;* T. Guilford Smith, *vice president;* James Savage, *secretary;* Philip Smith, *librarian.*

Palæontology. 31,000 specimens including duplicates: 1598 labeled fossils from foreign localities; the local collection of 567 specimens, particularly rich in crustaceans from the Waterlime group in the vicinity of Buffalo, there being some 80 varieties and 200 specimens of Pterygotus, Eurypterus, and Ceratiocaris; some interesting fish remains from the Corniferous, Hamilton and Portage groups, among which are specimens of the ventral armor of Dinichthys, plates of Homosteus(?), scales of Paleoniscus, etc. Material from the vicinity of Buffalo for exchange.

Mineralogy. The "Wadsworth collection" of 2836 specimens almost entirely from European localities, and specially rich in fine groups of fluorite, calcite, quartz and iron ore, of which there are some duplicates for exchange.

Historic geology. Local 573 specimens; general 1602 specimens.

Lithology. 2505 specimens.

Zoology. 7079 specimens: herpetology, 441; ichthyology, 144; conchology, 3332; entomology, 1535; ornithology, collection of 479 local and 596 foreign birds; 460 trays of eggs; mammalogy, 92 specimens, including a series of six American bison, whose fur shows the changes undergone at different seasons of the year.

Botany. 14,935 specimens: a very complete herbarium from Buffalo and vicinity.

Ethnology. 5000 specimens: 300 specimens of pottery from the province of Chiriqui, Central America; relics of the mound builders, mostly from Arkansas; and cliff dwellers pottery from Colorado; 3000 relics of the American Indians from their burial grounds near Buffalo. The greater part of these specimens are pottery, with a few flint implements. A large collection of North American Indian baskets and collection of material from the west coast of Africa.

One room in the building is devoted to the geology of Buffalo and vicinity.

Buffalo state normal school museum, Buffalo. I. P. Bishop in charge.

Paleontology. Three or four hundred specimens of Paleozoic invertebrates, mostly from the Silurian and Devonian systems.

Mineralogy. 300 species of the more common minerals collected from various sources; one set of Ward's "normal school" collection of 185 specimens, and a set illustrating color, glance, cleavage, etc. The species occurring in the metamorphic rocks of New York are well represented.

Historic geology. 50 specimens of metamorphic rocks, and stratified rocks from the typical localities.

Zoology. 100 mounted specimens of birds, and 50 alcoholic specimens, mostly vertebrates.

Botany. A herbarium of 300 or 400 species illustrating the local flora.

Canisius college, Buffalo. Rev. Frederic J. Hillig S. J., *professor of sciences*, in charge; Rev. Henry Wolff S. J., *assistant curator.*

Paleontology. 1000 specimens: 300 New York fossils; 300 Cretaceous fossils (Maastricht, Holland); 75 from the Bad Lands, South Dakota; 50 specimens of petrified wood.

Mineralogy. 800 specimens best representing calcite and silicates.

Historic and economic geology and lithology. 550 specimens: 250 rocks arranged by Ward, Rochester; 300 chiefly local.

Zoology. 50 North American and European mammals; 300 birds from United States, Austria and Denmark; 100 reptiles, etc. including some rare specimens from India; 2500 insects, illustrating the principal orders, specially Coleoptera and Hymenoptera, and including specimens from India, Brazil, Egypt, West Indies, Holland, etc.

Botany. 1600 specimens: American herbarium, 800; European herbarium, 100; European fungi, 500; seed collection, 200.

Ethnology and anthropology. 3000 specimens: Indian curios (Dakota), 50; old English curiosities, 300; coin collection including old Roman and medieval silver coins, 2500.

The museum also possesses 300 old books from 250 to 400 years old, including an interesting collection of about 50 old Bibles.

Colgate university museum of geology and natural history, Hamilton. Albert Perry Brigham, *curator*.

Paleontology. Collection is arranged zoologically, and contains several hundred specimens, chiefly of Paleozoic age.

Mineralogy. 1500 specimens fairly representative of all the groups.

Lithology. 500 specimens.

Historic geology. 1600 specimens largely of Paleozoic age.

Economic geology. 50 cubes of building stones from various horizons; 200 bottles of crude petroleum from most of the known petroleum regions; 25 specimens of oil sands, and 50 refined products of petroleum; and several hundred specimens of ores of gold, silver, copper, iron, etc.

Zoology. 1400 mounted birds; 1300 invertebrates, including many fine corals and tropical shells.

Botany. The Douglas herbarium of species from northeastern United States, of 1600 specimens, in 33 volumes; the Cobb collection of 1100 specimens of mosses, lichens, and ferns.

Ethnology. Garments, utensils, weapons, etc., from foreign missionary fields.

College of the City of New York, New York. William Stratford, *professor of natural history*, in charge of museum.

Paleontology. 500 specimens used chiefly for teaching. New York state formations best represented.

Mineralogy. 7500 specimens: consisting of a type collection of 1500 specimens; minerals of New York city, specially of the island of Manhattan, 2500; and sets for teaching.

Historic and economic geology and lithology. 2400 specimens.

Zoology. 3750 specimens: 1) type collections of vertebrates and invertebrates; 2) birds of New York city, Zerega collection; 3) insects of New York city, Dean collection; 4) fishes of New York city, Blackford collection; 5) many exotic forms; 6) corals, Decker collection; 7) corals, McFarlane collection; 8) Decker miscellaneous collection.

Botany. 550 specimens consisting of a working herbarium and several small collections of woods, seeds, fibers and fabrics.

Ethnology and anthropology. Small collection used for teaching.

The museum represents the local fauna and flora, minerals and rocks. A very complete set of zoologic types. A collection representing the industries of the city, e. g. furs, textile fabrics, tobacco, etc.

Columbia university museum, Columbia university, Morningside hights, New York city. Collections are in charge of the professors in the various departments: geology and paleontology, J. F. Kemp, assisted by A. W. Grabau, *adjunct professor*, and A. A. Julien, *curator;* mineralogy, A. J. Moses, assisted by L. McI. Luquer, *instructor*, A. F. Rogers, *tutor*, and J. S. McCord, *assistant;* zoology, H. F. Osborn, and E. B. Wilson, assisted by Bashford Dean, *adjunct professor*, G. N. Calkins, *instructor*, O. S. Strong and J. H. McGregor, *tutors;* botany, L. M. Underwood, assisted by C. C. Curtis, *tutor*, and J. K. Small, *curator*.

Paleontology. 50,000 specimens: extensive collections in invertebrate paleontology and fossil fishes, containing numerous type specimens in each of these divisions and specially rich in fishes from the formations of the Devonian and Carboniferous systems. The extensive collections of fossil plants formerly in this museum are now deposited at the New York botanic garden. Many duplicates for exchange.

Mineralogy. 25,000 specimens: an introductory collection illustrating the physical properties, characters, etc., of minerals; a systematic collection of many thousands of specimens of very wide distribution; working collections for use of students in the laboratory and in lectures. Many duplicates for exchange.

Historic geology. An attempt is made to illustrate the stratigraphy of North America, and to a smaller degree, of Europe; a dynamic collection illustrating the genesis and alteration of rocks.

Economic geology. Collections very complete illustrating specially the resources of North America and including ores, building stones and the minerals composing them; minerals used in the chemical industries.

Lithology. 25,000 specimens: working collections of rocks for both elementary and advanced work in petrography. Material for exchange.

Zoology. A good working series, specially rich in the Puget sound fauna, and embryologic preparations.

Botany. 500,000 specimens: the university collection proper; collections of the following botanists: Torrey, Meisner, and Chapman; the Austin and the Jaeger moss herbariums; and many smaller collections. Collections and library will be placed in the Bronx park botanic garden, where the advanced work will be carried on. Many duplicates for exchange.

Ethnology. The university avails itself of the collections of the American museum of natural history.

Cornell university museum, Ithaca. There is no museum staff, the collections being in charge of the professors of the several departments. Geology (including paleontology, mineralogy, economic geology and physical geography), Ralph S. Tarr, *professor of dynamic geology and physical geography;* Gilbert D. Harris, *assistant professor of paleontology;* A. C. Gill, *assistant professor of mineralogy and petrography;* Heinrich Ries, *assistant professor of economic geology*, and student assistants. Department of entomology and invertebrate zoology, John H. Comstock, *professor of entomology and general invertebrate zoology;* M. V. Slingerland, *assistant entomologist;* Alexander D. MacGillivray and W. A. Riley, *instructors in entomology.* Department of vertebrate zoology, Burt G. Wilder, *professor of neurology, vertebrate zoology and physiology.* G. S. Hopkins, *assistant professor of veterinary anatomy and anatomical methods;* B. B. Stroud, *instructor in physiology, vertebrate zoology and neurology.* Department of botany, George F. Atkinson, *professor of botany;* L. H. Bailey, *professor of general and experimental horticulture;* W. W. Rowlee, *assistant professor of botany;* G. N. Lauman, *instructor in horticulture;* E. J. Durand and Karl McKay Wiegand, *instructors in botany*, and Robert Shore, *assistant to professor of botany and head gardener.* Department of classical

archeology and history of art, Eugene P. Andrews, *instructor in classical archeology and curator of the museum of casts.*

Paleontology. Very complete collections including the following valuable material: The Jewett collection, accumulated by the late Col. Jewett when curator of the state cabinet of natural history, which is specially rich in New York fossils, containing many of the original specimens described in the state reports, and not a few unique specimens; rich faunas of the Cretaceous and Tertiary formations along the eastern and southern parts of the Union; a large number of characteristic English and European fossils; a fine series of English Mesozoic fossils; of Tertiary fossils from Santo Domingo; of preglacial fossils from Sweden; and numerous smaller collections from various typical localities in our own country; the Ward series of casts; the unique collection from Brazil made by Prof. Hartt and party on the Morgan expedition, containing the original specimens and a great number of duplicates.

Mineralogy. A large series of exhibition specimens arranged systematically and many thousand specimens arranged in study series; the Silliman collection accumulated by the late Benjamin Silliman jr, and illustrating the rarer and commoner mineral species; notable additions made from year to year by purchase and donation.

Economic geology. Collections illustrating the ores and useful minerals of the United States and to some extent foreign countries, and, though of recent date, already beginning to represent in detail the resources of the country. The collections of raw materials are supplemented by manufactured products. A number of mine models are being added.

Physical geography. An extensive series of maps, models and photographs of physiographic phenomena, largely for class use.

Zoology. The extensive collections are divided into exhibition and study series. The greatest pains have been taken to obtain and exhibit representative animal forms from all parts of the world, and carefully made dissections illustrating zoologic and morphologic ideas, such as the unity of general structure under

diversity of external form and mode of life; resemblances and differences between members of widely divergent types, and also between closely related groups, as man and the apes; the existence of apparently useless or injurious organs, etc. There is abundant material for the investigations of advanced students. In the number of well preserved and instructively prepared specimens of the brains of man and other animals, the museum is believed to be unequaled in this country.

The invertebrates include an excellent collection of corals and a very large collection of shells, the Newcomb collection. The museum also contains the complete series of glass models of invertebrates made by Blaschka, the papier-maché models of Auzoux, and a complete set of zoologic diagrams of Leuckart. The laboratory is kept supplied with alcoholic specimens of the typical marine forms studied by the students and supplied to them at cost.

Entomology. Many exotic insects and specimens of a large proportion of the more common species of the United States, which have been determined by specialists, and are accessible for comparison; sets of specimens illustrative of the metamorphoses and habits of insects; duplicates in the laboratory for the use of students; an equipment of microscopes and other apparatus necessary for practical work in entomology; an extensive and constantly increasing collection of histologic and embryologic specimens; full sets of typical specimens for study and comparison by the students.

Botany. Collections are very extensive but are not exhibited in the museum proper. The large greenhouses in connection with Sage college adjoin the rooms of the department, and are filled with many exotics representing the pteridophytes, gymnosperms and angiosperms, and offer available material at all seasons for studies in development, and histology, and furnish living plants for illustrative material for many of the lectures.

Space is provided for the study of plant growth, physiologic experiments, and for the handling and treatment of greenhouse plants, the latter being in charge of the head gardener of the de-

partment. The department also contains a large and growing herbarium, as well as collections of fruits, cones, nuts, fibers, a general collection of economic products, and a large number of specimens of the woods of different countries.

The flora of the region of Ithaca is very rich in species, and presents excellent opportunities for the student of systematic botany, and some facilities in the study of geographic botany.

Excellent facilities are offered to the students who are fitting themselves for (experiment) economic work in the courses of plant histology and in the study of the fungi. While the laboratory is distant from the seashore, it is well supplied with material of the marine algae for morphologic and developmental study of typical forms, and material preserved specially for the purpose is also supplied for investigations in development.

The collections also include the Auzoux and Brendel models representing the different groups of the plants, and other illustrative material in the way of charts, maps, etc.

Archeology. Collections are in a department by themselves. The museum of classical archeology, occupying the first floor of McGraw hall, is composed chiefly of casts representing the history of Greek and Roman sculptural art, but is also supplied with various plans, models, reconstructions, facsimiles of coins, etc. The nucleus of the collection was purchased with a fund of $7000 donated for the purpose by the Hon. Henry W. Sage. The instruction in archeology and history of art is given in part in the museum itself.

There is also a series of several thousand photographs of ancient ruins and architecture.

Glen Island museum of natural history, New Rochelle. Lewis M. McCormick, *curator.*

Zoology. Specimens comprise: 500 mounted birds, mostly from the state of New York, but including a few brilliant colored tropical birds; 4000 specimens of shells, 200 of corals, 100 of sponges, and a few skeletons, including a camel's and ibex's, and one of the three skulls of the Atlantic right whale preserved in this country; also in the zoologic garden, several hundred specimens of birds and animals confined in cages.

Botany. 500 specimens: an excellent series of the algae of Long Island sound.

Ethnology. Weapons and utensils from Somaliland, and the west coast of Africa, from Arabia and Egypt; also relics of the American Indians, of the pioneer settlers of America, and of the war of the rebellion; American coins and script money; an interesting collection relating to the whaling industry of New England.

The Glen Island museum is maintained and arranged for the instruction and entertainment of visitors to the resort, and is not intended so much as a place for research as for popular illustration in the various branches of natural history. To this end, special attention is being given to the descriptive labeling of specimens, and to the use of pictures, specially with the ethnologic exhibits. Typical, large, showy specimens receive the preference over the rarer forms prized by museums of research, but a strict standard of authenticity is maintained in all the collections.

Hamilton college, Clinton. Charles H. Smyth jr, *Stone professor of geology and mineralogy.*

Paleontology. 2500 specimens of fossils and rocks illustrating the geology of New York; 1750 illustrating the formations and the life of the United States; 600 fossils chiefly from Silurian formations of Europe; 500 fossil corals from the United States.

Mineralogy. A series of 10,000 specimens of minerals, of general distribution; a special series of New York minerals called "The Oren Root collection of New York state minerals."

Historic geology and lithology. 250 specimens from the new red sandstone, besides those mentioned under paleontology; United States geological survey educational series of rocks, 156 specimens; 80 specimens to illustrate the geology of the Lake Superior region; a large number of Adirondack rocks.

Economic geology. 1000 specimens of ores, coals, petroleums, building stones, etc.

Zoology. 2000 specimens of land, fresh-water and marine shells and a rare collection of Japanese shells; 300 ornithologic specimens from China; a case of New Zealand birds from the *Transit of Venus* expedition of 1874; 300 birds from Oneida

county, N. Y.; the Barlow collection of 13,000 entomologic specimens to which Judge Barlow has added valuable collections in ornithology and comparative anatomy; a series of 391 Japanese insects.

Botany. 3354 flowering plants and 395 ferns; a collection from China; Sartwell herbarium, the result of 50 years' work in botany, containing 8000 specimens of plants cured, labeled and classified in 62 volumes, and including 451 mosses, 226 lichens, 342 seaweeds, 600 fungi, 575 ferns, 314 grasses, 200 Ericaceae.

Hobart college museum, Geneva. As the chair of geology is vacant at present, the museum is in charge of Herbert R. Moody, *professor of chemistry.*

The paleontologic, geologic and mineralogic equipment comprises many thousands of specimens and many duplicates, but no catalogues are available at present.

Paleontology. Representative collection of the New York terranes; a nearly complete set of Ward's casts of vertebrate fossils; the original of Ward's cast of Castoroides ohioensis.

The collections in the departments of natural history and in ethnology are representative, but are in need of better facilities for exhibition.

Long Island historical society museum, Brooklyn. The office of curator vacant. Mary E. Ingalls, *assistant curator,* in charge.

Paleontology. 892 specimens: chiefly from New York state, and donated by the state geologic survey.

Mineralogy. A few hundred specimens, chiefly from New York state.

Historic geology. A series of 746 specimens of rocks, sands and clays from the glacial drift of Long Island; 148 of the rocks of Manhattan Island; charts of the rocks cut through in boring for the piers of the Brooklyn bridge, and for wells at Jericho L. I., College Point L. I. and Woodruff's pier, Brooklyn; cores from diamond drill borings at Hunters point, foot of Atlantic avenue, Brooklyn, and off the Battery point, New York city; 10 specimens from a well at Jericho L. I.; 5 from a well of the Nassau gaslight co., Brooklyn; 47 from Barnum's island, East Rockaway bay; 6 from Calvary cemetery, Laurel Hill Brooklyn; 5 from Fort Lafayette; 50 from Woodhaven L. I.; 30 from the

piers of the Brooklyn bridge; 11 from Wheatley hill; and 6 from Westbury station L. I.

Economic geology. Marbles from the United States.

Lithology. A few hundred specimens, including a general collection; 168 specimens of sands, clays and peats.

Zoology. 2000 specimens: 119 mammals; 750 specimens of the birds of Long Island, representing nearly all the native species; 923 birds eggs; 198 reptiles; many of the crustaceans and nearly all the shells of the Long Island coast; and a large collection of land and marine shells from the East and West Indies.

Botany. 4000 specimens: 87 species of woods native to Long Island; 800 land plants, including mosses and lichens; nearly complete collection of marine and fresh-water algae of Long Island; a herbarium of 3000 specimens of the flora of the western and southern states collected by the late Prof. George Scarborough of Vineland N. J.; large collection of foreign algae; 80 sheets of English algae prepared by Dr John Lightfoot, author of *Flora Scotia*, published in 1777.

Ethnology and archeology. 1600 specimens: 782 Indian relics from Long Island, including axes, scrapers, arrow and spear points, pottery, etc.; 93 Indian antiquities from western mounds; 108 specimens taken from graves at Ancon, Peru; 18 from Mexico; eight carvings from temples in southern India; musical instruments from India; material from the Pacific islands; Chinese games, dominos and cards; 80 Egyptian relics from tombs of the kings, near Thebes, including cloths, carved wooden images, heads, etc.; 92 specimens from China and Japan; a cast of the Rosetta stone; and cast of the egg of the Aepyornis, or "roc" of eastern tradition; case of relics from the wars of the revolution and rebellion.

Natural science association of Staten Island, New Brighton. C. A. Ingalls, *curator;* Arthur Hollick, *secretary.*

Mineralogy. 200 specimens: minerals from the serpentine area which extends from New Brighton to Richmond, Staten Island; minerals from the trap quarries at Graniteville; and those from the limonite beds.

Lithology. 200 specimens: 50 representing the native rocks of Staten Island (Archaean, Paleozoic, Triassic, Cretaceous and Tertiary); the remainder, erratics from the drift.

Paleontology and historic geology. 500 specimens: granites and serpentines of the pre-Cambrian; Mesozoic fossil plants in red shale and diabase of the Triassic; fossil plants and mollusks in the clays and specimens of fire clay and kaolin of the Cretaceous; silicified corals and fossil plants in the yellow gravel and limonite of the Tertiary; fossils from the boulders of the glacial drift, plant remains and mastodon molars; scratched boulders, clays and gravels, etc., of the glacial period of the Quaternary.

Zoology. 600 specimens: mammals; birds and their eggs; insects; crustaceans and shells.

Botany. 3000 specimens: the herbariums of Dr N. L. Britton, and Dr Arthur Hollick, representing the flora of Staten island.

Ethnology. 400 specimens of local Indian relics, including axes, arrowheads, hammerstones, net sinkers, pottery, etc.; also historic relics of the revolutionary war, including muskets, cannon balls, military buttons, spurs, coins, etc.; some old views, pamphlets, newspapers, posters, etc., relating to Staten island history.

The museum is strictly local, hence no effort has been made to exchange specimens.

New York state museum, University of the State of New York. Albany.

ADMINISTRATION AND GEOLOGY. Frederick J. H. Merrill, *director and state geologist;* Henry H. Hindshaw, *assistant in geology;* Frederick C. Paulmier, *assistant in zoology;* Herbert P. Whitlock, *assistant in mineralogy;* Harry C. Magnus, *junior assistant in geology;* Joseph Morje, *clerk and stenographer;* C. Adelbert Trask, *junior clerk;* Edward C. Kenny, *stenographer.*

PALEONTOLOGY. John M. Clarke, *state paleontologist;* Rudolph Ruedemann, *assistant state paleontologist;* D. D. Luther, *field assistant;* G. S. Barkentin, *draftsman;* Philip Ast, *lithographer;* Jacob Van Deloo, *clerk and stenographer;* Martin Sheehy, *helper;* H. S. Mattimore, *page and preparator.*

BOTANY. Charles H. Peck, *state botanist.*

ENTOMOLOGY. Ephraim Porter Felt, *state entomologist;* Charles H. Walker, *entomologist's assistant;* D. B. Young, *entomologist's assistant;* George W. V. Spellacy, *page.*

ETHNOLOGY. Rev. W. M. Beauchamp, *author of bulletins.*

Historic and structural geology. An introductory collection, about 300 specimens, is arranged to illustrate geologic terms and definitions; a systematic collection, about 3000 specimens of rocks arranged in ascending series, with explanatory labels and maps showing distribution, represent the geology of the state. There is also a collection containing 3000 specimens mostly collected by the older geologists of the state survey. This contains many large coral masses and slabs of fossiliferous rocks. A number of large specimens illustrate various structural features.

A good series of relief maps constitute a prominent feature of the museum. It includes the following models: southern New England, scale 2 miles to the inch; New York city and vicinity, scale 1 mile to the inch; Manhattan island, scale 1000 feet to the inch, showing the present street system and the roads and topography as they existed in 1776; Manhattan island, scale 1000 feet to the inch, colored to show the geology; Catskill mountains, scale 1 mile to the inch, showing the exact proportion between elevation and distance; Adirondack mountains, scale 1 mile to the inch; Syracuse and vicinity, scale 1 mile to the inch; Niagara gorge and vicinity, scale 500 feet to one inch.

Lithology. The collections are large but are mostly stored for want of exhibition room. The exhibition material includes: the Rosenbusch collection of massive rocks, 500 specimens; 100 specimens of foreign and domestic marbles and a series of rocks from the crystalline areas of the state.

Collections of the rocks of the state and of New Hampshire, the Rohn collection of rocks of the Lake Superior region and a series of sandstones and crystalline rocks of Pennsylvania are in storage.

Economic geology. There are very complete series of the state collections on exhibition.

75 12-inch dressed cubes constitute the main exhibit of building stones. There are also columns, slabs, etc. of marbles and granites and a large number of specimens of extralimital material, principally of such stones as are of commercial importance in the state.

The iron ore collection includes a series of large masses of magnetite, hematite, limonite and siderite from mines which

have been extensively worked, also very complete series of smaller specimens. The nonmetalic minerals are shown in a series of large cases and include very complete series of New York salt with supplementary material from England, Germany, and other salt-producing localities. Gypsum, lime, cements, quartz, feldspar, garnet, corundum, graphite and all other minerals of the state are exhibited in series from the crude material to the manufactured product. A series of New York state oils and specimens of the oil-bearing rocks and sands are shown. A large collection of clays and clay products fills all the space which can be devoted to it.

Paleontology. 1,000,000 specimens, mostly Paleozoic invertebrates derived from the New York formations; including upward of 5000 type and figured specimens which have been used in the publications on New York paleontology; also many unique specimens of Paleozoic fish. Most of the fossils are in boxes and drawers in the State Hall, not many on exhibition but all accessible to students. Fine slabs of medusae, crinoids, crustaceans and trails are here exhibited. The types are systematically arranged in the laboratory of the state paleontologist except for those on exhibition in Geological Hall.

In Geological Hall a series of 7000 typical specimens arranged stratigraphically to show the characteristic fauna of each formation. Although this collection has been made with special reference to New York, materials from outside have been freely used to complete the series up to and including the Carboniferous. A number of large Devonian trees and algae are exhibited and also slabs of trilobite, worm and reptilian tracks from various formations.

There is also a series of European Paleozoic invertebrates; a series of more recent invertebrates, largely European; the Cohoes mastodon (mounted); the Monroe mastodon (unmounted); a nearly complete skeleton of the Irish elk; a series of casts of large vertebrates and other vertebrate remains.

Mineralogy. 10,000 specimens, including the Gebhard, the Albany institute, the Emmons and the Kuntz collections. A systematic collection of 3000 specimens many of which are from the old iron and other mines of the state; an economic collec-

tion of 500 specimens; a crystallographic series and 800 specimens to illustrate special groups on exhibition. There is also a superb collection of hydrosilicates from Bergen Hill, N. J. and collections of meteorites and gem materials. Many duplicates for exchange.

Zoology. REPTILES. 37 species, 125 specimens as follows: alcoholic and mounted 101, casts 6, skeletons 7, skulls, etc. 11.

AMPHIBIA. 19 species, 92 specimens, alcoholic 86, casts 3, skeletons 3.

FISHES. 194 species, 1799 specimens, alcoholic 1737, mounted 18, casts 22, skeletons 12, teeth, jaws, etc. 10.

INVERTEBRATES. 250 species, 1786 specimens identified, a considerable number still unnamed. Besides these the museum possesses large collections of shells, including the Gould collection with 6000 species and some 60,000 specimens, a collection of shells from Mazatlan presented by Mr P. P. Carpenter, and a collection of New York shells specially rich in Unionidae.

The zoologic collections are mainly intended to represent the fauna of New York state.

Entomology. The Lintner memorial collection comprising some 4800 species, is specially rich in Noctuidae, and though not on exhibition, is open to students. Large additions are made yearly to the extensive biologic and systematic collections which are being arranged and classified as rapidly as means will permit. These are accessible only to specialists. There is a general exhibit of the more important insects affecting fruit trees, small fruits, garden crops and grains, comprising about 100 species and representing the various stages of each insects development together with its work so far as material permits. A special collection of species annoying or destructive about houses and those affecting stored products has been arranged along similar lines. A small collection of beneficial insects illustrates some of the more important of these forms and another of scale insects gives a good idea of the general appearance of members of this exceedingly destructive group. The forms injurious to forest and shade trees are well represented, the various stages and methods of work being illustrated in the two latter groups so far as possible. There is a special col-

lection of about 50 species illustrating the work of gall insects, and a general idea of the class Insecta may be gained from a small systematic collection of over 600 species and representing most of the important groups. In addition there are small collections in Denton tablets illustrating protective mimicry and some of our more beautiful native butterflies and moths, and a technical collection of 60 different articles illustrates the methods of collecting and preserving insects. Another collection representing the principal differences between the common, malarial and yellow fever mosquitos is on exhibition and small collections illustrating the species commonly occurring in spring, summer and fall and those of interest on account of unusual form, size or other characters are exhibited for the convenience of teachers and their pupils.

Botany. The space in Geological Hall assigned to the botanic department is on the second floor in the southern extension of the building. It is divided into two rooms. The front room is used for exhibition purposes and contains sections of the trunks of 75 of the trees native to New York, which are cut to show the vertical, transverse and tangential sections, one half of each section being polished and the other being left unfinished in order to give an idea of the appearance of the wood. There are also some specimens of historic interest and specimens showing various forms of injuries to trees and their natural repair. Photographs of trees and thin sections of their wood are exhibited in swinging frames, supported by upright standards; a collection of edible and poisonous mushrooms and an economic collection are shown in table cases. The rear room contains the office of the botanist, the library, the herbarium and workshop.

The herbarium contains about 9000 sheets of New York plants excluding fungi, 10,000 fungi and 25,000 sheets of extralimital species and duplicates.

Ethnology. A large collection of material pertaining almost entirely to the Indian tribes of the state, including masks, pottery, arrowheads, spearheads, amulets, scrapers, clothing, cradle frames, etc., is on exhibition on the fourth floor of the capitol.

The museum has also a fine collection of wampum belts.

New York university, University Heights. John J. Stevenson, *professor of geology;* Charles L. Bristol, *professor of biology.*

Paleontology. 16,000 specimens.

Mineralogy and lithology. 1500 minerals, rock-forming minerals and rocks.

Economic geology. 8000 specimens; coal, iron and oil are specially well represented. There are specimens from all known oil-producing localities and important illustrations of individual mines of gold, silver and copper.

Zoology. Large collections specially rich in Bermuda materials but only about 1000 specimens on exhibition.

Ethnology. Only a small part of the collection, about 500 specimens on exhibition. Most of the collections are at present in storage till room can be provided for their reception.

Niagara university museum, Niagara. The Rev. George J. Eckhardt, in charge; the Rev. J. A. Tracy and James F. Houlihan, *assistants.*

Paleontology. 2000 specimens. Also 40 typical specimens of the Clinton, Medina, Chemung and Niagara formations. About 200 specimens for exchange.

Mineralogy and economic geology. 400 specimens from New York, New Jersey, Colorado, California, Canada, Ireland and Italy divided into the following groups: quartz, feldspar, sandstones, limestones, carbon and metallic ores. About 50 specimens for exchange.

Lithology. Specimens from the Medina, Clinton, and Niagara formations.

Zoology. 130 specimens of native mammals, birds, reptiles, eggs and insects.

Botany. 300 specimens of native plants. There are also specimens in this department for exchange.

Ethnology and anthropology. About 60 emblems of worship and domestic articles; American, Chinese, Japanese and African; a few anatomic specimens. 100 numismatic specimens.

The museum will be glad to exchange fossils from the vicinity of Niagara for ethnologic and zoologic specimens.

Polytechnic institute museum, Brooklyn. Henry Sanger Snow in charge.

Paleontology. 1000 specimens: chiefly of Paleozoic age.

Mineralogy. 3000 specimens including what was formerly known as the Smith collection which is particularly rich in micas.

Economic geology. A series of ores, chiefly of silver, copper and iron.

Lithology. 500 specimens: series of plutonic and metamorphic rocks.

Zoology. 1000 specimens: chiefly shells and insects.

Ethnology. 100 implements of the stone and bronze ages.

Rensselaer polytechnic institute museum, Troy. The museum is under the direction of the trustees of the institute, and in charge of the instructors in the departments represented. John M. Clarke, *professor of geology and mineralogy.*

Paleontology. 1500 specimens adapted to purposes of instruction: chiefly from the Paleozoic rocks of New York and Pennsylvania with no type specimens, and largely the donations of Prof. James Hall.

Mineralogy. A collection of about 5000 selected minerals of great historic value, the choicest specimens of which constitute the students study collection.

Lithology. 3000 specimens: a very complete collection of recent volcanic rocks; a good series illustrating the structure of crystalline rocks; a series representing structural and dynamic phenomena; an economic collection of about 1500 specimens illustrating nonmetallic produces, metallic ores, and metallurgical processes and products.

Zoology. A collection of recent Mollusca comprising about 10,000 specimens; a small series of invertebrates and vertebrates for students' use; about 350 specimens of mounted birds, and a few mammals.

Botany. A general herbarium of 5000 plants; and about 300 specimens of woods.

Ethnology. Collection small.

St Lawrence university museum, Canton. William N. Logan, *curator.*

Paleontology. 1000 specimens consisting of fossil forms from nearly all geologic horizons between Cambrian and Pleistocene; also 100 specimens of ferns from the Coal Measures.

Mineralogy. 4000 specimens, the greater part arranged in cases; also 1500 specimens including 1000 polished marbles, granites, etc.: and 500 hand specimens including the United States museum educational series.

Geology. 300 specimens including clay stones, coals, glaciated stones, etc.

Zoology. 299 alcoholic specimens; 100 specimens of corals, sponges, etc.; also 500 conchological specimens, including a special collection of American unios. Small collections in entomology.

Botany. A small collection of ferns, woods, etc.

Ethnology. A small collection of arrows, pottery, and stone implements.

Syracuse university museum of natural history, Syracuse. James R. Day, *chancellor;* Charles W. Hargitt, *curator of biological museum;* Thomas C. Hopkins, *curator of geological museum.*

Paleontology. 1700 specimens: a series of 1000 specimens illustrating the paleontology of New York; a more general collection of 200 specimens; Ward's series of 500 specimens illustrating historic geology, including many casts of rarer specimens. Material for exchange.

Mineralogy. 5000 specimens; including a general collection of 250; the French collections of crystals and minerals 210; and the Cooper collection of 500 to 600 specimens of quartz and its varieties.

Economic geology. 300 specimens: ores and smelter products.

Lithology. 400 specimens: illustrating the principal types of igneous, sedimentary and metamorphic rocks.

Zoology. 1000 specimens: Mammalia, Reptilia, and Amphibia; a collection of birds, both mounted and unmounted; a series of fishes, illustrating the principal genera of the United States; collections of shells illustrating most of the principal families and genera.

Botany. 7200 specimens: a herbarium of phanerogams, including native forms and many from foreign localities.

Ethnology and anthropology. Indian implements and pottery; coins; a number of models, casts, and engraved tablets from ancient Egypt.

Union college natural history museum, Schenectady. James H. Stoller, *professor of biology and geology*, in charge.

Paleontology. 3000 specimens: fossils mostly from the Paleozoic formations of New York and the Carboniferous and Permian formations of Kansas and Nebraska; type specimens from the Permian of Kansas.

Mineralogy. The Wheatley collection of about 4000 specimens of general distribution; small collections aggregating 500 specimens from different parts of the United States.

Historic geology and lithology. 1500 specimens from various localities.

Zoology. 14,177 specimens: species, 25 mammals; 300 birds; 100 reptiles; 20 amphibians; 150 fishes; 50 alcoholic examples of mollusks; the Webster collection of worms, 1950 specimens; 375 insects; 400 crustaceans; 352 echinoderms; 125 corals; 60 sponges; 2270 mollusks and molluscoids; the Wheatley collection of shells, numbering 8000 specimens.

Botany. 10,000 specimens, many exotic, arranged according to Engler & Prantl's *Pflanzenfamilien.* The local collections are very complete, specially the ferns and their allies of Schenectady county. There is also a valuable collection, 2300 specimens of fungi, the gift of Mr J. B. Ellis.

University of Rochester, Rochester. H. L. Fairchild, *curator of geology;* Charles Wright Dodge, *curator of zoology.*

Paleontology. The collection contains about 8000 species of European fossils besides those from America, altogether represented by about 25,000 specimens. It is particularly rich in ammonites and Tertiary mollusks.

On top of the paleontologic cases, and on the walls above them, is a series of models representing in facsimile many of the most celebrated fossils. There are also a number of casts, including a megatherium, three species of Proboscidea, an armadillo, and

a colossal turtle; specimens of the cranium and tusks of Elephas ganesa, the skull of a mastodon, and skull of Dinotherium.

Mineralogy. 5000 specimens, classified and consecutively numbered according to Dana's *System of mineralogy*, representing a great majority of known mineral species, showing crystalline and amorphous forms of the mineral. The specimens are largely from European localities—the rich mining regions of Cornwall, Saxony and Hungary having furnished many of the choicest masses of ores and most brilliant crystals. Among the largest groups are the fluorites, the quartzes and the calcites. There are also special collections in illustration of crystallography and other structural and physical properties of minerals.

Economic geology. A new department, and divided into carbon minerals, ores, and building and ornamental stones.

Phenomenal geology. A large variety of material illustrating the phenomena of rock structure and formation, and many interesting points in dynamic and physical geology. Here are huge columns of basalt from the Giant's Causeway, and the Rhine valley; volcanic bombs from the extinct volcanos of central France; veins of the several kinds in larger rock masses; contorted and folded strata; metamorphosed rocks; jointed structure; "slickensides"; faults; flexible sandstone; glaciated rocks; rounded drift; ripple marks; impressions of rain drops; mud cracks, etc.; a large number of septaria, clay stones and other concretions.

Lithology. 3000 specimens classified according to Dana's *Manual of mineralogy and petrography.*

A large number of the specimens were collected by Prof. Ward from the localities where specific rocks were first described. Disposed in the drawers are special collections representing the geology of characteristic regions; among these are 150 specimens from Vesuvius, once in d'Archaic's cabinet, 180 from Tuscany, 100 from Mt Blanc, 120 from the Paris Basin, 80 from Saxony, 200 from central France, and several hundred collected by the state geological survey, representing the New York strata.

Zoology. 1000 specimens: considerable invertebrate material; South American mammals and birds; native fauna, and many typical forms of vertebrates in general.

Botany. The collection is for teaching rather than for illustrative purposes and consists largely of algae and fungi.

Ethnology. Considerable material not on exhibition, and not fully classified.

The museum includes the Ward collections in mineralogy, lithology, paleontology and phenomenal geology. These are the original collections of Prof. Henry A. Ward, and were accumulated by him through many years of labor and extensive travel in execution of a plan to create a complete museum of geology for use in teaching. The material thus successfully gathered was purchased in 1862 for the university, through the generosity of the citizens of Rochester, for the low price of $20,000. At that time it was the largest and choicest geologic collection in America, including about 40,000 specimens, handsomely mounted and labeled, and probably remains today unsurpassed in proportion and quality by any similar collection.

This museum is open to the public, and offers to the people and the schools of western New York an exceptional opportunity for the study of the earth's structure and history.

Vassar college museum, Poughkeepsie. William B. Dwight, *curator*, in charge of museum.

Paleontology. 8150 specimens consisting of a general collection of 5000 specimens, including the skeleton of a mastodon, 9 feet high and 21 feet long over all, a skeleton of a moa; lecture room collection always accessible for study to students of the geologic classes; the Hall collection no. 3, with some subsequent additions, about 3000 specimens. In the general collection, the Carboniferous and the strata above it are represented the more fully, chiefly by European specimens. In the lecture room collection the representation is fairly equal for the various strata in that part of it covered by the original Hall collection. Among the recent additions are about 100 fine sections of American fossil Bryozoa, accompanied by a specimen of each species prepared by E. O. Ulrich and a set of about 50 species of fossil ostracoid Entomostraca.

Mineralogy. About 3000 specimens in the general collection representing about equally the principal groups of minerals, purchased soon after the founding of the college from Ward's establishment, together with more recent additions; also a lecture room collection of 500 specimens always accessible to students in mineralogy. The ores and varieties of quartz are the more fully represented; there are also a large number of specimens of small size illustrating various crystalline forms; there are sets representing the various varieties of physical properties in minerals, and full sets of glass and wooden models of crystal forms.

Lithology. 800 specimens of rocks, including a selected representative collection of 150 typical rocks donated by the United States geological survey. There are about 100 microscopic sections of different kinds of rocks.

Zoology. 25,090 specimens including Foraminifera, plaster models, 150; Foraminifera, actual models, 200; sponges, 100; corals, 400; echinoderms and crinoids, 300; mollusks, chiefly shells, 18,000; crustaceans, 300; insects, 600; fishes, batrachians and reptiles, 40; birds, mounted and skins, 2600; birds eggs, 800; birds nests, 150; mammals, 100; osteologic specimens and various models, 400; alcoholic specimens (miscellaneous), 800; zoologic microscopic slides, 200.

Botany. 1700 specimens including the Merrill collection of ferns (pressed), 1000 specimens; a collection of ferns from the Hawaiian islands, 100 specimens; a general herbarium, 1500 specimens; 100 specimens of plants in many cases with open flowers, finely preserved in alcohol.

An adjunct to the museum is the Eleanor conservatory, containing many valuable plants (at least 1500) representative of the leading families, with facilities for their study.

Ethnology and anthropology. About 770 specimens, including arrowheads from many of our states, 350 specimens; Erminie A. Smith collection of ethnologic specimens of the Zuni Indians, 200; Orton collection of South American ethnologic and archeologic specimens, including valuable pottery, an ancient Peruvian mummy and a very rare compressed human head from the

Amazon river, 120; other miscellaneous archeologic and ethnologic specimens, 100.

Specially valuable specimens are, the type specimens of Trudeau's tern; several birds collected by Audubon, one of which, the great auk, the rarest of birds, was the original of his great steel plate engraving of the auk; a male specimen of the Labrador duck; several characteristic and finely mounted bird groups; a very large collection of South American humming birds; two condors, one reputed to be the largest in the country; a fine pair of California vultures; several ivory-billed woodpeckers; two male resplendent trogons; a moa skeleton; a mounted gorilla of great size and a skeleton of a gorilla; a fine narwhal tusk; a mammoth tusk and scapula; a mastodon skeleton; a fine group of the fur seal, male, female and pup from the Pribyloff islands; a mounted tarpon; a plaster cast of an immense fossil armadillo (Schistopleurum); 3 skulls of Titanotherium from Nebraska; a complete series of teeth in jaws of fossil horses illustrative of the evolution of that animal from the lower Eocene to the Pleistocene, donated by Prof. H. F. Osborn; a series of paleontologic casts of vertebrates, prepared at the American museum of natural history; a remarkably perfect and fairly complete specimen of the mosasaur C l i d a s t e s v e l o x, on a single slab of stone, 8 feet long, from the Cretaceous of Kansas; a set of 100 microscopic sections of bryozoans with accompanying specimens, prepared by E. O. Ulrich; a large set of Ziegler's embryologic models; a complete set of Reeve's *Iconica Conchologica*, and many other valuable conchological works, purchased with Witthaus's large and fine collection of molluscan shells and kept with them in the museum.

An annual fund of not less than $850, $100 of which comes from a legacy of J. P. Giraud jr and the balance from a fund established by the founder, Mr Vassar, is available for the purchase of new specimens.

Ward's natural science establishment (a commercial museum) Rochester. Frank A. Ward, *secretary and treasurer;* E. T. Iekes and H. L. Preston, in charge of the inorganic department; also a staff of 16 assistants in the various departments. This company is incorporated under the laws of New York, with a capital

of $125,000. The object is "collecting, preparing, manufacturing and dealing in objects of natural history."

Paleontology. 150,000 specimens representing all the geologic periods, and from all parts of the world; 1024 casts of celebrated fossils, most of the originals of which are in the various royal museums of Europe; and 100 different models and charts.

Mineralogy. 160,000 specimens of minerals from all parts of the world; a collection of meteorites containing over 200 falls and more than 350 specimens; series of specimens illustrating systematic mineralogy, physical mineralogy, crystallography, etc.

Historic geology and lithology. 22,000 specimens, including series illustrating general petrology and physical, dynamic and stratigraphic geology; a special series of about 125 specimens from the typical localities of the New York formations; 26 relief maps and models (geologic and topographic) of the most interesting geologic regions of the United States and abroad; several models illustrating dynamic and structural geology.

Zoology. 137,000 specimens: mounted specimens, skins and skeletons of mammals, birds, reptiles, batrachians, and fishes; also human skeletons and many anatomic models, charts and diagrams for use in instructing classes; a general collection in invertebrate zoology of 125,000 specimens representing 3000 species; and a special collection of 750 specimens of sponges containing many unique and undescribed forms.

Botany. 74 models illustrating the anatomy of plants.

Ethnology and anthropology. 5826 specimens of articles of war, use, ceremony and adornment of ancient and modern races from all parts of the world; also a large series of mummies and aboriginal skulls and skeletons.

All specimens in the establishment are for sale.

West Point mineralogical and geological cabinet. Samuel E. Tillman, in charge of the museum, assisted by Capt. R. P. Davis, artillery corps, and Capt. S. G. Jones, 11th cavalry.

Paleontology. 9074 specimens. A fairly representative assortment of the various forms of invertebrates from the Cambrian to the present time. A good collection of the fossils from the Carboniferous. A fine collection of the Mesozoic and Tertiary

mollusks, originally exhibited at the Crystal palace exhibition in 1851, and afterward bought for the military academy. The collection of recent mollusks is quite full and the collection of modern corals, fair.

In the Mesozoic collection there are 112 fossil forms from the Solenhofen limestone, and 200 plant leaves from the Dakota Cretaceous, both typical and excellent.

Mineralogy. 4563 specimens. A fairly full assortment of the ores of the common metals, of the varieties of silica (quartz) and the various silicates and calcareous minerals—no particular locality. Groups best represented are the ores of the metals and quartz.

Lithology. 644 specimens. Nearly all the species of the plutonic, metamorphic and volcanic rocks, together with many of the sedimentary rocks, including some fine marbles. A fine collection of the rocks of New England (250 specimens). An educational series of rocks from the United States geological survey, (156 specimens).

Ethnology and anthropology. Small number of implements of the Stone Age, and a small number of specimens of Indian pottery (Pueblo).

The museum also contains about 1200 unique or rare minerals, rocks and fossils not mentioned above including some large ammonites in section; some fine specimens of elephants' and mastodons' teeth, (Quaternary); a vertical section of the Coal Measures of Pennsylvania, with description; a vertical section of the Pennsylvania oil sands, with specimens of the sands and oils from different levels; plaster cast of American continents, with parts of Europe and Africa, and the bed of the Atlantic ocean; three exhibit collections of minerals, rocks and fossils for daily section room use, 1000 specimens each; a working collection of minerals, rocks and fossils for the same purpose, of 45,000 specimens (estimated from partial count). The cabinet also contains a set of crystal models, in glass and pasteboard (150).

NORTH CAROLINA

Davidson college museum, Davidson. J. M. Douglas in charge.

Paleontology. 3000 specimens. Paleozoic time is best represented, specially the Carboniferous system.

Mineralogy. 4000 specimens including the Brumley cabinet and the Oglethorpe university collection.

Historic geology and lithology. 2500 specimens particularly representative of the recent rocks.

Zoology. 800 specimens of shells.

North Carolina state museum, Raleigh. H. H. Brimley, *curator;* J. A. Holmes, *state geologist;* and T. K. Bruner, *secretary.*

Paleontology. Remains of marine and land vertebrates, including such striking forms as the mastodon, whales, sharks and other interesting forms, reptiles being particularly well represented.

Mineralogy. A systematic series of all the mineral species found in the state; a collection in crystallography; gem material and a very valuable collection of cut gems, including a specimen of diamond from Burke county; other native gems as ruby, sapphire, oriental topaz, cat's-eye, rhodolite, garnets, emerald, aquamarine, golden and opaque beryl; a lot of the semiprecious stones, and a small collection of meteorites.

Lithology. 500 specimens of the rocks of the state, arranged alphabetically by counties; 1000 specimens of rocks from which sections have been cut and samples analyzed.

Economic geology. A complete collection of the iron ores of the state, magnetite, hematite, limonite, siderite, pyrite; an exhaustive collection of gold, silver and copper ores in very wide variety; very full series of corundums and micas, talc, kaolins and other clays; granites, marbles and sandstones in systematic series showing both the finished and raw product; millstones; monazites in great variety, and zircons.

Zoology. The fauna of the state is well shown; a fairly complete series of the more conspicuous vertebrate forms including a 45 foot skeleton of B a l a e n a b i s c a y e n s i s; fur-bearing animals; game birds and animals; birds eggs; a large series of reptiles and fishes; a full collection of economic fishes,

mounted and a fairly complete representation of the marine invertebrate fauna of the state.

Botany and forestry. A collection of about four hundred specimens of officinal plants of the state. In economic series are shown the timber trees of the state in finished and rough condition, illustrated profusely by enlarged photographs, also tree sections showing normal and abnormal growth.

Ethnology. A few cases of stone implements and pottery, and some human remains include the bulk shown. Considerable additions are in prospect in the near future.

This museum is an exhibit of the natural resources of North Carolina only. No effort is made to secure anything else, and the few outside specimens listed have been acquired incidentally. Plenty of room is given everything, and the cases are of the best known types for exhibiting the classes of specimens they contain. The capacity of the museum has been doubled at this date, three large exhibition halls having recently been completed. These will be filled along the lines mentioned. About 35,000 feet of floor space are occupied.

University of North Carolina, Chapel hill. No report.

NORTH DAKOTA

North Dakota agricultural college museum, Fargo. C. H. Hall, *professor of geology*, assisted by J. H. Shepperd, H. L. Bolley and E. F. Ladd.

Paleontology. A representative collection of fossils from Cambrian to Tertiary. Petrified wood and diatomaceous earth for exchange.

Mineralogy. 1000 labeled specimens.

Historic geology. A large collection specially illustrative of glacial phenomena with numerous models and charts.

Zoology. 150 well mounted birds of the northwest; 200 specimens of reptiles and fishes and other animal specimens for class reference, including quite an extensive display of bones illustrating the osteology of certain diseases in the horse.

Botany. An extensive herbarium of native plants of North Dakota; a full collection of the cultivated and native grasses of the state exhibited in large bunches for display of the roots, leaves, stems and fruit.

Material for exchange includes many species of the native plants and nearly complete series of the grasses of the state, mounted on herbarium sheets, or in bunches.

Ethnology. 50 relics of the American Indians; large collection of continental and other moneys.

Red River Valley university museum, Wahpeton. Edward P. Robertson, *president of the university*, in charge.

Paleontology. A few hundred specimens: series of fossils from the Silurian formations of New York; from the Carboniferous formations of Pennsylvania; and from the drift of North Dakota.

Mineralogy. Collection small and of general distribution.

Historic geology and lithology. A few hundred specimens illustrating various geologic formations: the lignite beds of North Dakota; the Ortonville syenite; and the geology of the Bad Lands of North Dakota.

Zoology. 100 specimens representing the classes of birds, reptiles, insects, etc.

Botany. 200 specimens illustrating the local flora. The herbarium is the result of field work of the botany class, and of private study.

Ethnology. 500 specimens confined to relics of the American Indians: some Arickaree pottery from the banks of the Missouri river; gleanings from various Sioux village sites; and some specially fine large milling stones, used by the Indians in making pemican.

State university of North Dakota museum, Grand Forks. M. A. Brannon, *department of biology*, and E. J. Babcock, *department of chemistry and geology*, in charge.

Paleontology. 1000 specimens, representing fossils of the various formations from the Cambrian upward, specially the Cretaceous, Laramie and Tertiary formations. Some material for exchange.

Mineralogy. 2000 specimens of wide distribution. The Black Hills of South Dakota is the district best represented. Large variety of clays of economic value and lignite coals for exchange.

Economic geology. 800 specimens, including clays and clay products of various kinds, coals, sandstones and soils.

Zoology. 299 specimens: 12 mammals; 7 skeletons of mammals; 120 birds; 40 fishes; 10 reptiles; 10 amphibians; 100 invertebrates. 30 duplicate specimens of birds for exchange.

Botany. 4640 specimens: herbariums of 1200 species of phanerogams; 100 species of fungi; 340 species of algae.

1000 duplicate phanerogams for exchange.

Ethnology. 650 specimens: 200 of weapons and wearing apparel of the American Indians; 15 of Mexican and oriental wearing apparel and ornaments; and 300 foreign and domestic coins. Few duplicates for exchange.

OHIO

Antioch college, Yellow Springs. W. E. Wells, *professor of biology,* in charge.

Paleontology. 10,000 specimens: 300 graptolites, from England, United States and Germany; 5000 specimens, United States Silurian; 1000 Devonian; 500 Carboniferous; 1000 of later formations.

Mineralogy. 500 specimens; educational collection of United States geological survey and some others; no one locality well represented.

Historic and economic geology and lithology. Silurian, Devonian and Carboniferous fauna; metalliferous and nonmetalliferous ores and their products; common rock-forming elements and compounds; fairly good series of rocks of earth crust.

Zoology. 4000 specimens: two mounted mammals; a few poorly mounted skeletons; eggs; common invertebrates for class demonstration; 500 insects, unarranged; 3000 shells, unnamed.

Botany. 600 specimens: several hundred sheets of pressed plants from this locality, gathered by students; small collection of mosses.

Ethnology and anthropology. 20 specimens: pottery of the Mound Builders and several human skeletons and remains without date, obtained from small caves along the cliffs of the Little Miami river.

Baldwin university museum, Berea. A. G. Räab, *professor of natural science,* in charge.

Paleontology. 300 specimens, mostly Devonian and Carboniferous.

Mineralogy and geology. 500 specimens, including a general collection from the United States geological survey; specimens of the Berea, Cuyahoga and Bedford shales, mostly local, also specimens of the Berea grit with its numerous ripple markings. Could exchange specimens showing ripple markings, also cone-in-cone.

Historic and economic geology. Collections very small.

Zoology. 300 specimens mostly invertebrates.

Botany. Few specimens.

Case school of applied science, Cleveland. Frank M. Comstock, *professor of natural history.*

Paleontology. 7000 specimens: stratigraphic specimens, 576; zoologic, 1424; miscellaneous and unclassified material, 5000. Duplicates for exchange.

Mineralogy. 3000 specimens devoted to purposes of teaching, and not particularly complete in any group.

Historic and economic geology and lithology. 1854 specimens: illustrative of stratigraphic geology, 250 specimens; geologic phenomena, 200; an economic collection of 700; a collection of 800 illustrating the lithologic character of rock. Some duplicate material for exchange.

Zoology. 9651 specimens (3400 catalogued numbers): mammals, 80 mounted specimens; alcoholic specimens, 19; miscellaneous, 23; birds, 350 mounted specimens, 492 skins, and 630 nests and eggs; reptiles and batrachians, 229 alcoholic specimens; fishes, 224 alcoholic specimens; mollusks, 715 species in alcohol; Arthropoda, 380 species in alcohol; other invertebrates, 276 species in alcohol.

The above are catalogue numbers and include in many cases several specimens under one number. Duplicates for exchange.

Botany. 2724 varieties, illustrated by 3719 mounted specimens chiefly of the flora of Ohio. 1000 duplicate specimens, and exchange material.

Cincinnati society of natural history, Cincinnati. Joshua Lindahl, *director.*

Paleontology. 4882 specimens: a large general collection of fossils from North America and Europe; a practically complete collection of the fossils of the vicinity of Cincinnati; the Paul

Mohr collection of fossils, the greater part of which is not on exhibition on account of lack of space; and the most perfect pair of cores of horns of Bison latifrons in existence.

Mineralogy. 1296 specimens of general distribution.

Lithology. 734 specimens.

Zoology. Mammals, 150 species; including 37 species of Quadrumana; birds, 450 species, 1450 specimens, 220 sets of eggs, and 102 nests. Reptiles 103 species viz: Ophidia 43, Lacertilia 26, Chelonia 31, Crocodilia 3, and Batrachia caudate 35 species, 627 specimens, other batrachians not indexed. Fishes 391 species. Mollusca about 3000 species, of which only the Naiades have as yet been completely indexed 389 species, recognized in Simpson's *Synopsis*, 1497 catalogue entries. The balance of the collection, though mostly classified and much of it displayed in glass cases, has not as yet been indexed.

Botany. A mounted herbarium containing about 4000 species, an unassorted collection of about 10,000 unmounted specimens of woods, nuts, cones, etc.

Ethnology. The ethnologic collections of the society have, for lack of space in the museum, been deposited for the present time in the art museum in Eden park, with the only exception of the prehistoric Indian relics from the Cincinnati region. Of these there are 122 skulls, and two large cases filled with specimens from the so-called "prehistoric cemetery" at Madisonville, Hamilton county, just outside the city limits of Cincinnati.

Cuvier club of Cincinnati, Cincinnati. Charles Dury, *custodian of the collections.*

An organization for the protection of fish and game. The society possesses collections of birds and fishes, chiefly of the local fauna, and a library devoted to these subjects.

Heidelberg university, Tiffin. M. E. Kleckner, *professor of geology and biology, and acting professor of chemistry and physics.*

Paleontology. Material from the Silurian. Some specially fine cephalopods, Devonian, Carboniferous, Cretaceous, Tertiary and Quaternary systems; 100 plaster casts of fossils, including a megatherium and a mastodon skull.

Mineralogy. A fair presentation of the science.

Economic geology. 500 specimens: important varieties of ores, iron, copper, lead, zinc, gold, silver and antimony.

Zoology. 100 well mounted mammals and birds. Marine and fresh-water shells.

Ethnology. A few relics of the American Indians and the Mound Builders.

Hiram college museum, Hiram. George H. Colton, *professor of natural science.*

Paleontology. 1000 specimens: Paleozoic time is the best represented, but there is some material of later age.

Mineralogy. 1200 specimens: the more common minerals and ores from various localities.

Economic geology. 100 specimens: collections of building stones and fire clays.

Zoology. 1000 specimens: a collection of birds; shells from the Hawaiian islands.

Botany. A small herbarium and a small number of woods.

Ethnology. 2000 specimens: Indian relics from the neighborhood; some implements, war clubs, etc. from the South Sea islands.

Oberlin college museum, Oberlin. Albert A. Wright, *curator*, Lynds Jones, *assistant curator.*

Paleontology. 5700 trays of specimens, each containing from 1 to 50 individual specimens. This includes 4000 trays of Paleozoic fossils, one half of which are from the Carboniferous formations; a fine series of fossil fishes from the Upper Devonian formations, including type specimens of Mylostoma, Titanichthys, Dinichthys, etc.; numerous bones of Camarasaurus supremus Cope, from Canyon City Col.; a mastodon skull and tusks from Loraine county, O.; a series of 400 trays of Mesozoic fossils; 650 trays of Tertiary forms; and 300 of Pleistocene fossils from southern California.

Mineralogy. 2950 trays of specimens of general distribution; also a set of 900 trays for laboratory use.

Historic geology. General series of 1500 trays of specimens; a series of 2200 trays illustrating geologic phenomena.

Economic geology. 800 trays.

Lithology. 1200 trays of specimens; 4000 trays illustrating the varieties of rocks that are represented by the glacial boulders of the vicinity; a set of 300 glacial boulders approximately matched with the Ohio and Canadian rocks from which they were derived.

Zoology. 20,000 specimens: 60 mounted skins of mammals; 600 mounted skins of birds, and 1500 unmounted; 150 varieties of birds eggs in sets; 230 mounted and alcoholic specimens of reptiles; a complete set of the local fishes, 89 species, and a general collection of 580 mounted and alcoholic examples of fishes; 50 mounted skeletons and skulls of vertebrates; 5000 mounted insects; 4000 species of mollusks and other shells; and many hundreds of specimens of other invertebrates. Duplicates for exchange, particularly in the conchological collection.

Botany. 35,000 specimens: 15,000 specimens of phanerogams; 5000 of fungi; and an extensive series of United States lichens, mosses and algae. 15,000 duplicates for exchange.

Ethnology. 3500 specimens: representative collections of Japanese armor, weapons, apparel, etc.; Siamese utensils and apparel; weapons and apparel of the Dakota Indians; 45 specimens of Eskimo implements; Pacific islanders arms, utensils, mats, and apparel; south African weapons, apparel, and utensils; and a very complete collection (2000 specimens) of relics of the American Indians from both the east and west coasts of the United States. Several hundred articles from southeast Africa for exchange.

There are also in the museum various collections of historic interest.

Ohio state university museums, Columbus. J. A. Bownocker, *curator of geologic museum;* Herbert Osborn, *curator of zoologic and entomologic museums;* James S. Hine, *assistant in charge of zoologic and entomologic museum;* W. A. Kellerman, *curator of botanical museum;* W. C. Mills, *curator and librarian of archeologic museum;* Pearl Contillier, *assistant in archeologic museum.*

Paleontology. 9000 specimens; the formations best represented are the Hudson, Niagara, Corniferous and Coal Measures; valuable collections of fishes from the Corniferous limestone and Ohio shales; the collection is also rich in Coal Measures flora.

Much material for exchange from the Hudson, Niagara, Corniferous and Coal Measures.

Mineralogy. 500 specimens.

Economic geology and lithology. The economic museum contains about 2000 specimens illustrating Ohio material; in lithology there are about 500 specimens, including the Hawes collection from New Hampshire; the Williams collection from Baltimore; the Rohn collection from Lake Superior and the Krantz and Rosenbusch collections from Europe. Besides these the museum contains the Voigt and Hochgesang collections of thin sections of minerals and rocks.

Iron ores, building stones, coals and crude oils from Ohio for exchange.

Zoology. 25 mounted and 50 alcoholic specimens of mammals; 250 mounted specimens and 2500 skins of birds, mostly from North America; 100 jars of reptiles, 45 jars of batrachians, 289 jars of fishes, 96 jars of invertebrates, 300 skeletons, skulls and anatomic preparations; 3500 specimens of mollusks; and about 40,000 specimens of insects. Total number about 50,000 specimens. The Ohio fauna is well represented throughout the collection.

Entomologic specimens for exchange.

Botany. 3000 museum specimens, 80,000 herbarium specimens: a general herbarium of 30,000 mounted sheets; state herbarium of 20,000 mounted sheets of spermatophytes and pteridophytes; about 10,000 bryophytes and thallophytes; the W. A. Kellerman herbarium of 20,000 parasitic fungi; a museum consisting of 3000 specimens of 1) native trees of Ohio shown by sections of trunks, bark, slabs of wood, polished wood, twigs, leaves, flowers and fruit; 2) wood panels; 3) economic products; 4) medicinal plants of Ohio; 5) miscellaneous specimens.

Some herbarium specimens for exchange, principally fungi.

Ethnology and anthropology. 100,000 specimens representing archeologic material from every county in the state.

Archeologic material for exchange.

The museum also contains specimens of books printed in Ohio; specimens illustrating the settlement of Ohio and the Northwest territory.

All specimens collected by the geologic survey of Ohio are required by law to be placed in the charge of the state university.

Ohio Wesleyan university, Delaware. Edward L. Rice, *curator and in charge of collections of zoology and anthropology;* Lewis G. Westgate, *professor of geology, in charge of collections of geology, mineralogy, paleontology and botany.*

Paleontology. 5000 specimens including casts; the Devonian and Silurian formations are best represented; some good Devonian fishes; collection of 1000 Ward casts.

Mineralogy. About 2000 specimens.

Economic geology and lithology. About 1000 specimens.

Zoology. General collection, corals specially well represented; about 20,000 specimens of Mollusca, 500 of which are Unionidae. Total number of specimens 25,000.

Botany. About 300 specimens of woods.

Ethnology and anthropology. About 1200 specimens, mainly North American stone implements; including 500 choice and well selected specimens of the William Walker collection.

Lantern slides of geographic and geologic subjects and Ohio Corniferous fossils, specially corals, for exchange.

Otterbein university, Westerville. W. C. Whitney, *professor of biology and geology*, in charge.

Small working collections, of direct use in teaching, in nearly all lines but not for display.

Scio college, Scio. J. H. Beal in charge.

Mineralogy. 2000 to 3000 specimens.

Historic and economic geology and lithology. 500 to 800 specimens.

Zoology. 150 specimens.

Botany. 800 to 1000 specimens of American plants and woods.

Ethnology and anthropology. Small collection.

Specimens are distributed throughout the departments and in care of instructors using same.

University of Wooster, Wooster. No report.

Urbana university museum, Urbana. John H. Williams, *dean.*

Good general collections but not at present on exhibition.

Western Reserve University, Cleveland. F. H. Herrick, *curator of biology;* H. P. Cushing, *curator of geology.*

Paleontology. 6000 specimens: the S. G. Williams collection, mainly of New York Paleozoic, 2500; various small gifts and purchases; Silurian, Devonian and Eo-Carboniferous best represented.

Mineralogy. 2500 specimens: a very old collection obtained by purchase and by donations of Dr Kirtland and Col. Whittlesey; small and scattering recent additions.

Lithology. 1200 specimens mostly igneous rocks.

Zoology. 10,000 specimens: the R. K. Winslow collection of birds; the Kirtland society of natural history collection; private collection of the late Dr J. P. Kirtland; the general collection of Western Reserve university.

Botany. 1000 specimens: fairly complete collection of the Ohio flora.

OKLAHOMA

University of Oklahoma, Norman. Charles N. Gould, *curator.*

Museum collections destroyed by fire January 1902, new material is now being secured.

OREGON

Oregon state agricultural college museum, Corvallis. A. B. Cordley, *professor of zoology,* in charge of museum; W. T. Shaw, *assistant.*

Mineralogy. 1000 specimens.

Zoology. Small collection of Oregon mammals, Oregon birds and marine invertebrates.

Entomology. 75,000 specimens of Oregon insects, mostly Lepidoptera, Coleoptera, Hymenoptera, Diptera and Hemiptera.

Specimens of Coleoptera, Hemiptera, Diptera and Hymenoptera for exchange.

Botany. 8000 to 10,000 specimens of phanerogams and vascular cryptogams. 10,000 to 15,000 unclassified specimens. About 500 fungi, etc. About 10,000 to 15,000 specimens of Oregon and Washington phanerogams and vascular cryptogams for exchange.

Portland university, Portland. No report.

University of Oregon, Condon museum, Eugene. Thomas Condon, *professor of geology;* Chester Washburn, *assistant.*

Paleontology. 6000 specimens: the collection is principally Oregon material, it contains 500 specimens from the marine Tertiary of Oregon and the largest collection which has been made of Tertiary vertebrates from the John Day beds and other deposits of Eastern Oregon and type specimens including Unio condoni White, Scalaria condoni Dall, Platygonus condoni Marsh, Anchitherium condoni Leidy, Oreodon superbus Leidy, Hippa eocensis Washburn, Hippa miocensis Washburn.

Mineralogy. 800 specimens, general collection.

Economic geology and lithology. 900 specimens: collection of Oregon building and ornamental stones; ores of the Pacific Coast; metamorphic and igneous rocks of Oregon. Some material for exchange.

Zoology. 1000 specimens, collection of flowering plants and a private collection of fungi. A collection of Oregon woods for furniture, cabinet-making, etc.

Ethnology. 325 specimens, implements, etc., of Oregon Indian tribes.

Williamette university, Salem. No report.

PENNSYLVANIA

Academy of natural sciences of Philadelphia, including collections of the second geological survey of Pennsylvania, Philadelphia. Samuel G. Dixon *president;* Samuel G. Dixon, Henry C. Chapman, Henry A. Pilsbry, and Arthur Erwin Brown, *board of curators;* Witmer Stone, *assistant curator;* David McCadden, *taxidermist;* F. W. Wamsley, *preparator of marine animals;* Stewardson Brown, *conservator of botanic section;* Henry Skinner, *conservator of entomologic section;* H. A. Pilsbry, *special curator of conchology;* Witmer Stone, *ornithologic section;* Theodore D. Rand, *curator of the Vaux collection of minerals;* Rev. L. T. Chamberlain, *curator of the Lea collection of Eocene fossils.*

Paleontology. 45,000 specimens: the Lea collection of Eocene fossils, containing many type specimens described by Lea; the

Joseph Wilcox collection of Pliocene fossils; the Conrad and Gabb collections, containing many of Conrad's type specimens; an extensive collection of vertebrate fossils, among which are many of the types described by Cope and Leidy.

Mineralogy. 16,000 trays of specimens: large general collection; the William S. Vaux collection, specially endowed and constantly increasing—most of the specimens being exceptionally fine.

Historic geology and lithology. Several thousand specimens not at present arranged for exhibition.

Zoology. 1,059,400 specimens: 9000 mammals, representing species from all parts of the world, including mounted and unmounted skins and skeletons; one of the finest collections of birds in America, numbering 46,000 specimens; mounted and unmounted skins, including the type specimens described in Gould's *Birds of Australia*, as well as many described by Cassin, Townsend and others; 4400 jars of reptiles, including many type specimens described by Cope; 4000 specimen jars of fishes from all regions, including the Bonaparte collection; 850,000 specimens of mollusks, forming the largest collection in America, and including many type specimens described by Tryon, Lea, Say, Pilsbry, and others; 126,000 insects, including the Martindale collection of Lepidoptera; and the George H. Horn collection of Coleoptera. 20,000 specimens of other invertebrates, specially of crustaceans and echinoderms.

Botany. 200,000 specimens representing 40,000 species: collections of Nuttall, Read, Buchley, LeConte, Shortt and others; most of the series made by recent collectors in America; very large herbarium of old world plants; the Ellis and Everhart collection of fungi; the George A. Rex collection of Myxomycetes.

Ethnology. 10,000 specimens: a general collection; the Clarence B. Moore relics of the Florida and Georgia mound Indians; the Peary relief expedition collection from Greenland; the Haldeman remains of North America Indians and native tribes of British Guiana; and the Morton collection of crania numbering 1100 specimens.

Exchanges made in all departments.

One room of the museum is devoted to the natural history of eastern Pennsylvania and New Jersey, and contains collections

in all departments of zoology, geology and mineralogy; also the Delaware valley ornithological club's collection of birds of that region, mounted with their nests and eggs, which attracts special attention.

Albright college, Myerstown. J. B. Stober, *professor of natural sciences and chemistry*, in charge of all collections, except those in anthropology, which are in charge of A. E. Gobble, *president*.

Paleontology. 700 specimens, chiefly from the Paleozoic formations.

Mineralogy. 775 specimens, including some typical specimens of silicates.

Geology. Iron ores from the state; a collection illustrating primordial metamorphism.

Zoology. 1300 specimens: marine invertebrates donated by the Smithsonian institution; recent shells and corals; labeled collection of fresh-water and marine fish; mounted specimens of the higher orders; and materials for class use in dissection and in lectures on comparative anatomy.

Botany. 500 specimens. 125 duplicates for exchange.

Ethnology. 300 specimens: historic relics, ancient and modern, coins; and relics of the American Indians.

Alleghany college, Meadville. J. H. Montgomery, *curator*.

Paleontology. Many specimens and a collection of Ward casts.

Mineralogy. About 10,000 specimens consisting of the Alger collection; the Prescott collection; and the Haldeman collection.

Historic and economic geology and lithology. Small collection, part of which was furnished by the United States national museum.

Zoology. About 100 mounted birds, a few specimens of animals in alcohol and 20 miscellaneous specimens mounted and unmounted. One fine mounted specimen of moose from Maine, the Prescott collection of shells, 5000 in number; also a set of shells from United States national museum.

Botany. Collection of local plants.

Ethnology and anthropology. About 100 specimens.

Boys central high school, Philadelphia. No report.

Bryn Mawr college, Bryn Mawr. Florence Bascom, *professor of geology*, in charge.

Paleontology. 700 species illustrated by 3500 specimens: chiefly invertebrate fossils, selected to cover geologic time from the Cambrian to recent, the Miocene species being the best represented.

Mineralogy. 950 specimens best representing Pennsylvania localities.

Lithology. 86 specimens and slides illustrating the geology of the Lake Superior region.

156 specimens and slides of the educational series of the United States geological survey, 14 specimens of the igneous rocks of Arkansas; 150 specimens from the Boston Basin and the Yellowstone national park; 60 specimens and slides from the Blanc massif, 100 specimens of eruptive rocks from the neighborhood of Christiania, Norway; 180 slides of the Rosenbusch igneous series; 28 specimens and slides of the Rosenbusch crystalline schist series and a full suite of the metamorphic rocks of Pennsylvania and Maryland.

Miss Bascom's private collection of 1450 specimens and 500 microscope slides illustrating foreign and American geology is accessible to students.

There are also biologic and ornithologic collections belonging to the college.

Bucknell college, Lewisburg. No report.

Carnegie museum, Schenley park, Pittsburg. W. J. Holland, *director;* staff includes 20 persons.

Paleontology. Large collections of vertebrate fossils made in Colorado, Wyoming, Nebraska and Montana. Specially rich in Dinosauria. Many types of species recently discovered. The best specimens of Diplodocus and Brontasaurus in existence. Large collections of invertebrates and fossil plants.

Mineralogy. 7000 specimens representing about 500 species.

Historic and economic geology and lithology. Considerable collections obtained by staff of museum and by purchase.

Zoology. 850,000 specimens. Mammals 550 species; birds 3000 species; fishes 300 species; reptiles 250 species; crustaceans 150 species; insects 72,000 species; mollusks 15,500 species;

marine invertebrates 420 species; about 45,000 species represented by types or paratypes.

Botany. 120,000 specimens representing 22,500 species. A fine series autographically labeled by the older American botanists.

Ethnology and anthropology. 6750 specimens. Collections representing the aboriginal tribes of North and South America, Africa and Asia and considerable collections from Egypt.

The museum publishes a series of octavo Annals and quarto Memoirs. Endowment, $1,000,000.

Dickinson college, Carlisle. No report.

Geneva college museum, Beaverfalls.

Small general collection.

Haverford college museum, Haverford. H. S. Pratt, *professor of biology*, in charge.

Lithology. A small collection of rocks.

Zoology. 1075 native and foreign birds; 422 varieties of birds eggs; 4000 European beetles.

Botany. A collection of native and foreign plants.

Lafayette college, Easton. Frederick B. Peck, *professor of geology and mineralogy*, in charge.

Paleontology. A good working collection.

Mineralogy. 1000 specimens representative of the chief American and European localities. Minerals from Franklin Furnace N. J. for exchange.

Zoology. Fairly good representation of systematic zoology, together with a series of study collections for the use of students.

The museum was burned in 1898. New collections are now being made.

Botany. A large herbarium of the Pennsylvania flora, representing seven eighths of the North American species; many European, African, Indian, and Australian plants.

Lebanon Valley college, Annville. No report.

Lehigh university, South Bethlehem. *See* Addenda, p. 222.

Muhlenberg college, Allentown. W. R. Whitehouse in charge.

Paleontology. 600 specimens, representing the fauna of the various geologic periods.

Mineralogy. A general series of 500 representative specimens.

Lithology. 400 specimens: illustrative of the various formations of Pennsylvania; a partial series from Minnesota.

Zoology. 500 specimens, representative of the principal divisions of invertebrates, with a very few vertebrates.

Botany. 3000 specimens, mostly from Lehigh county, with some material from other localities.

Pennsylvania college, Gettysburg. E. S. Breidenbaugh, *curator.*

Mineralogy. 6000 specimens, general, representing most of the mineral species, and including a number of excellent crystals; 500 specimens in iron, copper and zinc metallurgy.

Lithology. 3000 specimens illustrating the general features of rock structures.

Botany. 6000 specimens: a general herbarium of eastern United States flora; some few varieties from Brazil.

There are no ethnologic collections.

Pennsylvania geological survey, Harrisburg. Collections deposited in the Academy of natural sciences of Philadelphia.

Paleontology. 2128 fossil invertebrates from Pennsylvania, ranging from the Potsdam sandstone through the Carboniferous formations; 549 fossil plants collected by Leo Lesquereux to illustrate the paleobotany of the coal formations of the state; 1248 specimens from Perry county, collected by E. W. Claypole, including 30 type specimens of invertebrates; and 293 Waverly and Chemung fossils, collected by F. A. Randall in the vicinity of Warren.

Mineralogy. 135 specimens collected by F. A. Genth, mostly from the southeastern part of the state.

Historic geology and lithology. 10,000 specimens: separate collections from sections across various counties and other portions of the state made by the survey members and arranged for exhibition accordingly; 146 specimens of glacial erratics collected in the state by H. C. Lewis; 1127 specimens collected by John F. Carll from the oil region, including a valuable series of sand pumpings and an economic collection of samples of crude petroleum from the various wells.

Pennsylvania military college, Chester. No report.

Pennsylvania state college, State College. The collections are not united as a museum, but each technical department has a collection which is in charge of the head of the department. M. E. Wadsworth, *professor of mining and geology;* N. W. Shed, *assistant in mining and metallurgy;* W. A. Buckhout, *professor of botany;* H. A. Surface, *professor of zoology;* H. P. Armsby, *professor of agriculture;* and G. G. Pond, *professor of chemistry.*

Paleontology. 2000 specimens: the Ward collection representing all geologic formations; Corniferous fossils from Columbus O.; specimens from the Cincinnati group of southeastern Indiana, from the Niagara group of Waldron Ind. and from the Subcarboniferous limestone of Indiana; fossil leaves from the Cretaceous formations of Dakota; material from the Trenton and Hudson river groups about State College Pa., and from the Coal Measures of Allegany Pa.

Mineralogy. 10,000 specimens: a large exhibition collection; a series illustrating physical properties, crystallization, etc., for the use of students.

Historic geology. A general stratigraphic series; the material collected by the first and second geologic surveys of Pennsylvania.

Lithology. A series of European rocks; rocks of the state; and a set of the United States geological survey collection of 200 rock types.

Economic geology. 5000 specimens: the Pennsylvania exhibit of ores, minerals and economic products at the World's Columbian exposition; a polylith of 281 building stones of Pennsylvania and elsewhere; special collections of ores and ore-bearing rocks from Colorado and iron ores from the Lake Superior region; a general collection of economic minerals and rocks from Germany.

Zoology. 15,000 specimens: a general collection of 10,000 specimens; a special series of Pennsylvania vertebrates, a nearly complete representation; a special collection of insects showing their various stages of development and their work.

Botany. A herbarium of 4000 phanerogams, a series of 1500 species of seeds; specimens of woods of Pennsylvania from the state forestry exhibit at the World's Columbian exposition.

The Philadelphia museums, Philadelphia. William P. Wilson *director;* Gustave Niederlein, *chief of the scientific department;* Frederic Lewton, *curator of natural products;* Ernst Fahrig, *chief of laboratories;* George E. Lindin, S. Frank Aaron, Alexander MacElwee, Charles R. Toothaker, *assistants.*

The collections are almost exclusively economic, and are intended to represent in the best manner possible the commercial products and commerce of all countries of the world. They are at present classified under five principal heads: 1) materials of plant origin—including woods, fibers, tans, dyes, gums, resins, oil seeds, oils, coffees, drugs, tobaccos, grains, fruits, foods, herbariums, etc.; 2) materials of animal origin—wools, hairs, furs, skins, pelts, hides, food fishes, shellfish, silks, waxes, honeys, cochineal, sponges, pearl, etc.; 3) materials of inorganic origin—ores and metallurgic preparations, coals, petroleums, clays, coloring earths, salts, flints, sulfurs, building materials, etc.; 4) materials showing the habits and customs of nations—garments, ornaments, models of boats, carts, barrows, cars and other vehicles, utensils of domestic use, agricultural implements, weights, measures, legal forms and commercial headings, current money, games, weapons, musical instruments, etc.; 5) manufactured goods including articles imported by various countries except from the United States, articles made in various countries for home consumption, articles made in various countries for export.

The collections are rich in all departments and all told include about 250,000 specimens (estimated carefully). Particular mention should be made of the collections of foreign cabinet woods, fibers, gums and resins, grains, drugs, coffees, raw silks, raw wools and manufactured textiles, all of which are probably unsurpassed. A herbarium has recently been established which contains 7000 specimens and is growing rapidly. Mention should be made of a type collection of reptiles from Colombia, which includes some 13 new species described by the late Prof. Cope in a paper not yet published.

An extremely important department is the Commercial museum's bureau of information. Its primary object is to promote international trade, particularly the foreign commerce of the United States. To this end, it gives information of the

natural resources and raw products of all countries. It has thousands of correspondents in commercial centers of the world, and at frequent intervals sends members of its staff to the four quarters of the globe. This information thus secured is placed at the disposal of American business men, and the activity of the museum in this direction is a principal and very potent factor in the promotion of American trade abroad.

Swarthmore college museum, Swarthmore. Spencer Trotter of the department of biology in charge.

Mineralogy and geology. The Joseph Leidy collection of exceedingly choice cabinet specimens of crystallized minerals, characteristic rocks and ores, and transparent and opaque models of the various systems of crystallizations; the Robert R. Corson collection of stalactites, stalagmites and helictites, illustrating the limestone formations of the Luray caverns, the second in magnificence in the world; an educational series of rocks from the United States geological survey.

Zoology. The Wilcox and Farnum collection of mounted birds, including nearly all the species which inhabit, or visit, the state; a collection of several hundred bird skins for study and reference; a large series of partial and complete skeletons prepared at Ward's natural science establishment illustrating comparative osteology and the structure and framework of backboned animals; the C. F. Parker collection of choice typical land, freshwater and marine shells; a large and constantly increasing collection of stuffed and alcoholic examples of vertebrates and invertebrates (including the United States fish commission educational collection); of dissected specimens for demonstration in lectures; glass and papier-maché models of invertebrates, and of special points in morphology.

Botany. 2000 specimens: the Eckfeldt herbarium illustrative of the flora of Pennsylvania.

Ethnology. The Frederick Kohl ethnologic collection, containing Indian implements, weapons, clothing, etc., mostly from Alaska; the North Greenland collection, deposited by Samuel J. Entrikin of the Peary expedition.

The collections of the college are strictly for use in teaching, the specimens being in constant use in the lectures and in the

laboratories. They are growing steadily, but always in the direction of rendering more perfect the means of illustrating the different branches of natural history, and with no intention of building up a collection of curiosities or miscellaneous articles.

Thiel college, Greenville. No report.

University of Pennsylvania, Philadelphia. Amos P. Brown, *professor of mineralogy and geology*; John M. Macfarlane, *professor of botany and director of the botanic garden;* Edwin G. Conklin, *professor of zoology;* and Stewart Culin in charge of the ethnologic collection.

Paleontology. 15,000 specimens: a series of fossils from the various Paleozoic formations of New York state, some of which are the type specimens described in the *Paleontology of New York;* Cretaceous fossils from the western states; Cenozoic and Mesozoic fossils from the Gulf and Atlantic coasts; many type specimens of the Galveston Tex. deep well fossils: various individual type specimens, and small collections; and a duplicate set of a part of the Paleozoic invertebrate fossils collected by the Pennsylvania geological survey. Monographic collections of certain groups are also included; as for example Bryozoa by Ulrich, and Ostracoda by Bassler.

Specimens from the Atlantic and Gulf coasts of Eocene, Miocene and Pliocene invertebrates in excellent condition, for exchange.

Mineralogy. 20,000 exhibited specimens and 5000 duplicates forming a nearly complete series of the known and recognized species of minerals. New York, New Jersey, Pennsylvania and North Carolina are specially well represented; Europe and the western states are also well represented. The collections of Dr F. A. Genth, Prof. E. D. Cope and Dr S. B. Howell, of the university, are included, also numerous donations, including the important Clay collection and about 100 duplicate specimens from the Bement collection. The recent purchase of the Cardeza collection of minerals of southeastern Pennsylvania and adjoining states has increased the collection by some 10,000 specimens. Dr Genth's corundum alterations are represented by a set of specimens.

Specimens from New York, New Jersey and the west and many local minerals for exchange.

Historic geology. Material illustrating the Paleozoic age generally, the Cretaceous of America, the general Mesozoic of Europe, and the Cenozoic of eastern America.

Economic geology. 2000 specimens: ores representing all of the principal western mining localities, specially those that were prominent 15 years ago; iron ores and coals from various parts of the United States.

Lithology. 2000 specimens of rocks illustrating the typical formations of America and Europe. Specimens of the local rocks, and ores from the west, chiefly gold and silver for exchange.

Zoology. 3000 vertebrates: material for a synoptic and comparative anatomic collection; the osteologic collection of the late Prof. Cope, including the Hyrtl collection of nearly 1000 beautifully prepared fish skeletons, which formed the basis of much of Prof. Hyrtl's studies on the osteology and of Prof. Cope's work on the classification of fishes; illustrations of local fauna; very complete collections of fishes; batrachians, lizards and birds from Pennsylvania, New Jersey, Jamaica, the Bahamas and the Grand Cayman.

10,000 specimens of invertebrates: a collection of many groups from the Bahamas and Jamaica obtained by the university expeditions of 1887 and 1890-91; the Leidy collection of parasites, including many types; the C. Pennock conchological collection; the Wheatley collection of the fresh-water mollusks of the world; and a large series of models and preparations illustrating the embryology and anatomy of both vertebrates and invertebrates. A vivarium containing living marine, fresh-water and land animals of almost every class.

Botany. A herbarium of 23,000 sheets: an extensive collection of alcoholic specimens for class use and 1200 alcoholic museum specimens illustrating comparative morphology; a set of the De Royle botanic models; and a botanic garden collection including 3200 species of living plants.

Ethnology and archeology. Five sections, each one of which is in charge of a curator.

The American section contains a very complete exhibit of antiquities from the cliff dwellings of Colorado presented by

Mrs Phere A. Hearst, and a similar exhaustive collection from Pachacamac, Peru, excavated by Dr Max Uhle and given by the late Dr William Pepper. These are displayed on two sides of the principal American hall. Lack of space prevents the public exhibition of other American collections, although the latter are available for purposes of study. They comprise a large and representative series of antiquities of the eastern United States, mound pottery and relics, and some 3000 American craniums; and are supplemented by extensive collections from existing tribes, notably a fine Eskimo collection from Point Barrow, Alaska, the gift of the Hon. John Wanamaker, and an extensive collection made during 1900-2, also at the expense of Mr Wanamaker. The Brinton library of works on American ethnology and linguistics, deposited by special arrangement with the university trustees in the museum library, greatly facilitates research in these departments. Mexico and Central America are represented by casts of monuments and valuable collections of pottery and stone implements.

The general ethnologic collections are contained in three halls, one of which is devoted to the Furness, Harrison and Hiller collections from Borneo. The same donors have recently presented a similar valuable series from the Naga Hills in Assam, and a representative series illustrating the life of the Ainos of Japan has recently been received from Mr Alfred C. Harrison and Dr H. M. Miller. Notable features of this section are comparative collections of musical instruments, fans and games, as well as a comprehensive collection of coins. Korea, China, Japan, Siam, Burma, Morocco and Russia are also represented by large exhibits.

The Babylonian and general Semitic section contains a large and extremely valuable collection of antiquities, the greater portion of which is the result of extensive excavations of the ruins of Nippur, in central Babylonia. Much time and labor have been expended in a thorough exploration of the principal mound of these ruins, which covers the temple of Bel, presumably the oldest sanctuary in Babylonia. Among the most important objects thus secured are about 35,000 cuneiform documents in clay. The Babylonian museum is the most important in America, and ranks immediately after the British

museum and the Louvre. The cuneiform documents of the fourth and second millennium B. C. can nowhere be studied to greater advantage. Hundreds of terra cotta and glass vases; Hebrew and Syriac bowls; about 700 fragments of the most ancient inscribed stone vases and votive tablets; nearly 600 seal cylinders; clay coffins; charms; a large amount of gold and silver jewelry, and other objects of art; all serve to illustrate the life and customs of the ancient inhabitants of Mesopotamia, and of the Semites in general. The committee in charge having, in 1898, obtained from the sultan a firman granting permission to continue its excavations at Nippur for a term of three years, and having raised $30,000 for the purpose, deemed it expedient to concentrate its efforts on two seasons. The wisdom of this decision has been justified by the importance of the results. Foremost among these is the discovery of the library of the temple, from the ruins of which large numbers of precious ancient documents have been exhumed, and brought to the university where they will be published.

Under the reorganization of the department, which took place in 1899, the section of casts has ceased to exist. Already, in 1898, the committee had voted the funds at its disposal to the Egyptian and Mediterranean section for the purpose of securing some original ancient sculptures; and the casts acquired through its efforts were distributed and installed in the sections to which they respectively belonged. Thus the reproductions of important Central American monuments from Quiriguá and Copan may now be seen in the American section; while the great bas-reliefs of Trajan's arch at Benevento, and the important series of marbles found in the neighborhood of Lake Nemi on the site of a temple of Diana Arecina, form the most striking feature of the Greco-Roman hall in the Egyptian and Mediterranean section.

The Egyptian section has secured important series of objects illustrating the history, arts and industries of Egypt, from prehistoric times down to the Greco-Roman period. From the Egypt exploration fund, the American exploration society and the Egyptian research account, the committee in charge each year receives a fair share of the objects discovered.

In 1898 the museum was enriched by a fine seated Ka-statue of an Egyptian nobleman called Nenkheftek, who lived under the fifth dynasty, and whose tomb at Deshasheh was opened that year. With it have come the skeleton of the original and other valuable sepulchral deposits of the old Egyptian empire. From Behnesa an interesting collection of objects of the Roman period was obtained. The most important part of the acquisitions from this site, however, is a portion of the rich find of Greek papyri, which will eventually come to the museum.

In 1899 objects of inestimable value, dating from the earliest dynasties, were received from Hierakonpolis, among them being a superb alabaster vase inscribed in the name of King Kha-Sekhem, and 10 ivory carvings representing the men and women who inhabited the Nile valley about 4500 B. C. Interesting acquisitions from Dendera and Hu were also added.

In the years 1900-2 the work of the Egypt exploration fund proved of more than usual importance. Having obtained permission from the Egyptian government to go over the ground just excavated by a French syndicate at Abydos, Mr Petrie's finds and scientific results were of the utmost interest, the collections from this earliest stratum of Egyptian history having proved of peculiar value. Through the liberality of the American exploration society, which has assumed the financial responsibility involved in cooperating with the Egypt exploration fund on behalf of the department of archeology, a liberal share of the objects discovered will come to Philadelphia. Among these are a stele of King Qa, and several stone fragments and ivory tablets inscribed in the names of other and early successors of King Mena.

Of the founder of the United Egyptian Empire himself, an ebony tablet inscribed in his name may be seen, as well as other fragments and objects of his reign. Inscriptions and objects from the tombs of kings of the 1st, 2d, and 3d dynasties and even of pre-Menite rulers are among the new series. It is therefore fair to state that the collection, as far as regards the Archaic period, is unique in this country.

The Mediterranean collection comprises an important series from Cyprus and interesting Greek, Etruscan and Roman antiquities.

The excavation of some Etruscan tombs at Narce, Chiusi, Cervetrii, Vulci, Bizentium, Ascoli, Civita Castellana, Orvieto, Corneto and Tarantum, undertaken for this section, resulted in a splendid series containing a number of unique specimens.

Among these six Etruscan sarcophagi of stone representing the defunct reclining on his bier, excavated at Civita-Musarna, near Viterbo (third century B. C.) are a striking feature. These collections are the gift of the late Dr Pepper, of Mrs Hearst and the American exploration society and of the Hon. John Wanamaker. The Dillwyn Parrish collection has been enriched by a collection of demotic papyri, which will be added to its already important series of ancient manuscripts.

An expedition sent to Crete on behalf of the museum by the American exploration society, in the summer of 1901, under the direction of Miss H. A. Boyd and Miss Wheeler resulted in the discovery at Gournia of a Mycenaean town of about 1200 B. C. Paved and drained, albeit narrow streets, houses, a shrine and a palace were brought to view, and many objects of pottery, bronze, stone, etc. were discovered. A complete series of enlarged photographs illustrate in the museum this important discovery.

Two of the most valuable and interesting exhibits of the museum are deposited in the section of glyptics to which the western wing of the first floor of the Museum building is devoted. One consists of an exceedingly valuable collection of engraved gems and amulets presented to the university by Prof. Sommerville; the other a completely equipped Buddhist temple, also the gift of Prof. Sommerville.

The glyptic collection represents the life work of its donor, and covers epochs of gem engraving from the earliest eras to the present time. They are so arranged that visitors may, through the medium of these beautiful engraved stones, cylinders, seals and Gnostic tokens, inform themselves intelligently on the science which these gems of all epochs so notably exemplify.

A large number of objects from Buddhist temples, secured by the donor in his travels through the Orient, have been

arranged in the form of a Buddhist temple. This shrine contains gods, effigies, symbolic flowers, temple furniture, and fittings of every description secured from places of worship in almost every eastern country. During the winter months, Prof. Sommerville gives a series of public lectures on "Buddhism" in this unique temple on Sunday afternoons at 2.30 o'clock.

The collections are open to visitors daily, holidays excepted, from 10 a. m. to 5 p. m. On Sundays, they are open from 2 p. m. to 6 p. m.

For the prosecution of special studies in the museum, application should be made to the various curators in charge of the several sections.

Wagner free institute of science, Philadelphia. Thomas L. Montgomery, *actuary;* Thomas H. Montgomery jr, *director* of museum; Charles W. Johnson, *curator* of museum.

Paleontology. 20,000 specimens: a general collection arranged stratigraphically, specially rich in American Tertiary.

Mineralogy. 2000 specimens: a general and a local collection.

Zoology. 25,000 specimens: local, general and synoptic collections.

Botany. 1000 specimens: a local collection; a set of "Musci borali-Americani" by Sullivant and Lesquereux.

Ethnology. The Clarence Bloomfield Moore collection of 1200 relics from the fresh-water shell mounds of the St Johns river valley, Florida; described in the *American naturalist*, 1892-93.

Free lectures are given at the Institute on the following subjects: chemistry, biology, geology, physics and engineering. Classes are formed in connection with the lectures, the institute providing the textbooks, and the museum furnishing material for study. The William Wagner reference collection of books on natural science is open to the public every day for reference purposes and there is a branch of the free library of Philadelphia in the building which furnishes books for home use.

Washington and Jefferson college, Washington. Edwin Linton, *professor of biology and geology*, in charge.

Paleontology. Collection contains several hundred exhibited specimens, and three or four times as many which are not yet

arranged. The collection is particularly rich in fossil plants of the upper Coal Measures.

Mineralogy. 2500 specimens: a general collection for purposes of illustration in lectures and class work; rich in silicifications from Colorado and ores of silver and copper from Tombstone Ariz.

Historic and economic geology. 1000 specimens: collections distributed from the United States geological survey and the second geologic survey of Pennsylvania; a series collected in Connecticut and Massachusetts; and specimens illustrating the formations of several mines belonging to the Anaconda mining company in Montana.

Zoology. 2000 specimens exclusive of duplicates: a systematic collection of the marine invertebrates and fishes of southern New England; tropical shells and corals; two collections of fresh-water shells; and a number of skeletons and other material for classroom illustration.

Botany. 500 specimens exclusive of duplicates: 110 species of phanerogams from northern India, 108 from Indiana and a number from Connecticut; an incomplete series of phanerogams and ferns from western Pennsylvania; 130 species of the mosses of western Pennsylvania collected and identified by Prof. Linn and Prof. Simonton of the college.

Ethnology. 800 specimens: material illustrating the industries, products and particularly the religious customs of the people of China, Japan, India, Siam, etc.; a collection from the tribes along the west coast of Africa; pottery etc. from Alaska and New Mexico.

Westminster college, New Wilmington. No report.

RHODE ISLAND

Brown university, Jenks museum of zoology, Providence. A. D. Mead, *curator.*

Paleontology. 10,000 specimens: a small general collection of fossils; an exhaustive series of the fossils from the Carboniferous formations of Rhode Island. Duplicates for exchange.

Mineralogy. A general collection of 5000 specimens. Material for exchange.

Historic geology and lithology. 500 specimens intended for class work.

Zoology. 25,000 specimens: general synoptic collections illustrating the various divisions of the animal kingdom: a series illustrating the geographic distribution of Rhode Island fauna. Duplicates for exchange.

Ethnology. 1000 specimens.

The museum includes the collection of the Rhode Island medical society.

Museum of natural history, Roger Williams Park, Providence. James M. Southwick, *curator.*

Paleontology. 750 specimens of general interest, including trilobites, crinoids, mollusks, fish and mammal remains; 70 specimens of plants from the Carboniferous rocks of the state.

Mineralogy. 1200 specimens illustrating 400 species and varieties: some excellent specimens, both European and American.

Historic geology. Collections chiefly illustrate the result of glacial action in Rhode Island.

Zoology. 6000 specimens: 250 species of sponges, corals and echinoderms; 1000 species of shells; 1200 species of insects; 30 species of fish; 25 species of reptiles; 500 species of birds and mammals; 125 species of eggs; the collection of mounted Rhode Island birds practically complete containing 292 species and 490 specimens.

Ethnology. 3000 specimens of Rhode Island aboriginal implements and 2000 specimens of implements from the United States and Canada; 40 specimens of dress of North American Indians; and a few implements from the South Sea islands.

There is a library of 950 books and pamphlets treating of the various objects in the museum, intended for study and reference, but not for general circulation.

Rhode Island college of agriculture and mechanic arts, Kingston. John H. Washburn, *president.*

Collections are as yet only small synoptic series for class use.

SOUTH CAROLINA

Claflin university, Orangeburg. W. J. Morrill, *director.*

Paleontology. 250 specimens: teeth and bones from phosphate rock.

Mineralogy. 3000 specimens: kaolinite, monazite sand and other South Carolina minerals.

Historic and economic geology and lithology. 300 specimens.

Zoology. 1500 specimens: mammals, birds, reptiles, shellfish, insects and lower forms. Coleoptera and Lepidoptera for exchange.

Botany. 1000 specimens: pressed plants and blocks of wood sections. South Carolina species of jessamine, azalea, dogwood, magnolia, long-leaf pine, etc. for exchange.

College of Charleston, Charleston. George H. Ashley, *curator and professor of biology and geology*, in charge.

Paleontology. 5000 specimens, including many types of fossils from phosphate beds, Tertiary invertebrates from Alabama, and a small collection from Europe and points in this country. The Tertiary is well represented. The museum has for exchange some shark's teeth from type localities.

Mineralogy. About 2000 specimens. Shepard collection of phosphate rocks, native and foreign; a collection of Russian minerals; Florida phosphates; Shepard general collection and small collections.

Economic and historic geology and lithology. About 200 or 300 specimens.

Zoology. About 7000 specimens. Mammals, mounted skins 200, one fourth of which are characteristic exotic species, and one fourth range in size from the camel to the Malay tapir; skeletons 125; birds, mounted skins 800, including a large and choice series of exotic forms, skeletons 50, eggs 250, nests 70; reptiles and amphibians, mounted skins 75, skeletons 20, in alcohol 95 jars; fishes, mounted skins 100, skeletons 20, in alcohol 115 jars; invertebrates, 5000; types of Audubon and Bachman's mammals. The museum has for exchange some specimens of mollusks, etc.

Botany. 5000. Elliott herbarium, rich in types; Ravanell herbarium; Biltmore herbarium and many others.

Ethnology and anthropology. About 500–1000 specimens. Casts of Assyrian, Egyptian, Grecian, Aztec, monumental art, mummy and cases; copies of Etruscan vases; between 500 and 1000 miscellaneous specimens, Indian, South Sea, African, etc.

The collections are now being rearranged.

Furman university, Greenville. W. F. Watson, *professor of chemistry and natural history*, in charge.

Palcontology. Collection small.

Mineralogy. A fair collection of the most common minerals from a great variety of localities; a limited number of good crystals.

Lithology. 300 specimens.

Zoology. A fine collection of stuffed mammals, birds and reptiles, known as the Marshall museum, of great value and very useful.

Ethnology. 100 specimens: implements and utensils of the American Indians.

South Carolina college, Columbia. F. C. Woodward, *president and professor of English.*

The college museum has twice been destroyed, so that the collections now are little more than what are needed for class use.

Wofford college, Spartanburg. No report.

SOUTH DAKOTA

South Dakota geological survey, Vermilion. James E. Todd, *state geologist.*

The collections made by this department are in the custody of the University of South Dakota, and are described with the other collections of that university.

State school of mines, Rapid City. Cleophas C. O'Harra, *professor of mineralogy and geology*, in charge.

Palcontology. 900 specimens: 300 Cretaceous fossils; 200 specimens (parts of vertebrates) from White River Bad Lands; 400 miscellaneous.

Mineralogy. 3000 specimens: mostly Black Hills minerals.

Historic and economic geology and lithology. 1200 specimens: ores and sedimentary, metamorphic and igneous rocks of the Black Hills region.

University of South Dakota, Vermilion. J. E. Todd, *professor of geology and mineralogy;* C. P. Lommen, *professor of biology,* in charge.

Paleontology. 1125 specimens representing 500 species: a general collection of 125 representing 50 species; 500 representing 300 species of the Paleozoic invertebrates; 350 representing 100 species of Mesozoic invertebrates, largely from Dakota; 200 representing about 50 species of the fossil vertebrates, mostly from the Miocene formations of Dakota; and a number of fossil vertebrates from other Tertiary formations.

Mineralogy. 700 specimens: a crystallographic collection of 250 specimens representing 100 species; a general collection of 400 specimens representing 250 species; and microscope slides of 150 species and varieties.

Economic geology. 150 specimens of nonmetallic and 250 metallic ores.

Lithology. A general collection of 300 specimens; a series of 150 of Ward's typical rocks.

There is also a collection illustrating stratigraphic geology.

Zoology. 900 specimens representing 843 species: an educational collection of 475 specimens representing 435 species, from the German exhibit at the World's Columbian exposition; 15 representing 11 species of Australian mammals; 19 representing 17 species of Australian birds; 130 specimens and species of North American fishes received from the Smithsonian institution; a series of 200 specimens and species of Dakota insects; and 500 microscope slides.

Botany. 1200 specimens representing 193 species: 43 models of different species of German fungi; a herbarium of 1000 specimens and species of the flora of Germany; and Dakota flora, numbering 157 specimens representing 150 species.

The collections of the state geological survey are included with those of this university.

Yankton college, Yankton. George A. Clark, *professor of biology*, in charge.

There are fairly good working collections in zoology, including typical specimens of all the subkingdoms; collections illustrating the local flora; and several cabinets of rocks and minerals.

These collections are not arranged for exhibition as a museum.

TENNESSEE

Carson and Newman college, Mossycreek. No report.

Cumberland university museum, Lebanon. James S. Waterhouse, *professor of chemistry and natural science*, in charge.

Paleontology. 1500 fossils of general distribution; a number of casts of famous fossils.

Geology and mineralogy. 600 specimens: a general study series. Also a collection of rocks furnished by the United States government.

Zoology. Small collections of dried and alcoholic specimens. A fine collection of Japanese shells, including 500 species with many duplicates.

Botany. Only a few specimens besides a good series of microscope slides.

Fisk university, Nashville.

Small general collection.

Zoology. 500 specimens.

Botany. 2000 specimens.

Small working collection of rocks and minerals.

Maryville college museum, Maryville. A. F. Gilman, *professor of chemistry and mineralogy;* M. E. Kennedy, *professor of biology, botany and geology;* Hugh R. Crawford, *assistant.*

Paleontology. 750 specimens: college collection of coal fossils, calamites, ferns, club mosses etc.; Black River corals; massive fossiliferous limestone; Bates collection of miscellaneous fossils; Webb collection of fossils of the Cincinnati period. About 100 Black River corals and fossils of the Cincinnati period for exchange.

Mineralogy. 1000 specimens: Dr F. Kantz collection of 200 specimens from Europe; college collection of 400 typical specimens from the United States; A. F. Gilman collection of 450 New England typical specimens; all classified according to Dana. About 100 duplicates for exchange.

Historic and economic geology and lithology. 200 specimens: United States government collection of 150 specimens of rocks of the United States; Keefe collection of choice specimens of Tennessee and Vermont marbles.

Zoology. 300 specimens: 100 birds eggs; Fisher collection of 150 alcoholic fishes of the United States; 100 dried specimens of echinoderms, corals, sponges, etc.

Botany. 478 specimens: Caulkins collection of 400 choice specimens of lichens of Tennessee; M. C. dendrology club's collection of 78 specimens of woods of natural growth on the campus.

Ethnology. 410 specimens: M. C. club of Japan collection of 150 specimens of Japanese books, weapons, garments, armor, household utensils, coins etc.; 20 Chinese articles, 50 Indian; 30 Persian; 150 Mound Builders relics; 10 American Indian specimens.

The museum also contains class flags, foreign flags and banners, some of the original scientific apparatus of the college, the first communion set brought into east Tennessee, the spinning wheel of the wife of the founder of the college, and a series of ancient books and manuscripts.

Milligan college, Milligan. No report.

Southern normal university, Huntingdon. No report.

Southwestern baptist university, Jackson. No report.

Southwestern presbyterian university, Clarksville. S. R. McKee, *professor of chemistry*, in charge.

Mineralogy. 6000 specimens prepared for inspection and study.

Lithology and palæontology. A large collection of rocks and fossils.

Zoology. 16,000 shells; on exhibition in the Stewart Cabinet building.

Botany. 500 mounted specimens.

University of Tennessee, Knoxville. Samuel M. Bain, *professor of botany.*

Paleontology. Small collection of casts and fossils.

Mineralogy. A small working collection.

Zoology. Several thousand insects and a small collection of alcoholic specimens of other animals.

Botany. 30,000 specimens including many types of Chapman, Gattinger, Scribner and others.

Duplicates for exchange.

Ethnology and anthropology. Small collection of Indian relics and casts of same.

Vanderbilt university, Nashville. L. C. Glenn, *professor of geology,* in charge; George W. Martin, *professor of biology.*

Paleontology. 15,000 specimens: Sturtz and Krantz collections; the Safford collection of Tennessee Paleozoic fossils and Mesozoic and Cenozoic fossils from Tennessee and Alabama; the Glenn collection of Atlantic coast Cenozoic invertebrates. Material for exchange.

Mineralogy. 4000 specimens: Sturtz and Krantz general collections.

Historic and economic geology and lithology. 2500 specimens: classic European and American rocks, both igneous and sedimentary; Tennessee Paleozoic rocks.

Some Tennessee rocks for exchange.

Zoology. 2000 specimens: the commoner forms of Tennessee and the south; both vertebrates and invertebrates; shells; some forms from the Woods Hole station. Material for exchange.

Botany. 5000 specimens: collections of lichens and algae. Material for exchange.

Ethnology and anthropology. 800 specimens: stone and bone articles and pottery from the Tennessee and Florida mounds.

Walden university, Nashville. Harold Steele, *professor of natural science,* in charge.

Paleontology. 100 specimens: material illustrating the fauna of the Lower Silurian formations in Tennessee, and of the Carboniferous formations of northern Illinois. A few brachiopods and corals for exchange.

Mineralogy. 400 specimens: a small general collection; a series of gold and silver ores from Colorado; and iron ores from Tennessee. A few Tennessee minerals for exchange.

Economic geology. 50 blocks of building stones of Tennessee, besides the material mentioned in the mineralogic collection.

Zoology. 1000 specimens: a series of the mammals, reptiles, batrachians, etc., of Tennessee; 116 mounted birds of general distribution; a study series of 400 birds illustrating the avifauna of Colorado and Tennessee; 50 sets of birds eggs; small collections of shells and stuffed fishes and 8000 insects.

Insects of all orders, birds, birds eggs and reptiles for exchange.

Botany. A herbarium of 300 specimens representing 150 species. 100 specimens for exchange.

Ethnology. 150 specimens from Africa, chiefly handiwork of some of the native tribes; a collection of coins and currency of various nations.

In the museum of the medical department of the college are collections of chemicals prepared by the students; crude drugs; and a series of pathologic specimens.

TEXAS

Howard Payne college, Brownwood. No report.

University of Texas, Austin. This university does not maintain a museum, but has collections in geology, biology, botany, etc., which are used for purposes of instruction. All books, collections, specially rich in new or recently described forms, both vertebrate and invertebrate, as well as in minerals illustrative of the resources of the state; and also apparatus and specimens belonging to the discontinued Geological survey of Texas authorized by an act of the state legislature have now been installed at the university, thus more than doubling its resources. Frederic W. Simonds, *professor of geology;* William M. Wheeler, *professor of zoology;* William B. Phillips, *professor of field and economic geology;* and William L. Bray, *adjunct professor of botany.*

Paleontology. American Paleozoic fossils; a series of Texas Cretaceous fossils, and Texas Tertiary fossils presented to the

university by George W. Brackenridge, a member of the board of regents.

Mineralogy. A general collection of specimens from all parts of the world; a series of typical crystals and a collection sent by the United States national museum.

Economic geology. A series of specimens illustrating the mineral resources of Texas; a collection illustrating the occurrence of lead and zinc in southwest Missouri.

Lithology. A general collection of rocks from all parts of the world; collections sent out by the United States national museum and by the United States geological survey; a set of rocks from the typical American localities, with slides for microscopic study.

Zoology. A complete set of the Leuckart and Nitche zoologic wall charts; Brendel's and Ziegler's models; the Linnaea alcoholic preparations; several fine skeletons; and a local collection.

Botany. A herbarium of Texan plants, Kny botanical charts, and others hand painted.

Ethnology. The Swenson collection of coins and medals. A few years before his death, S. M. Swenson gave the university a valuable collection of coins and medals. Of the 3476 coins, 2217 are bronze, 1172 silver, and 87 gold. Many of these coins were in use before the Christian era, and, with few exceptions, none are of more recent date than the sixth century. Of the 1846 medals, 607 are silver and the remainder bronze and white metal, plated and gilt. There are 94 Russian medals, illustrating the rise and progress of that country from the time of Ruric to that of Czar Alexander. American, French, English and Swedish medals make up the remainder and illustrate historic events of great importance in these countries. Many of these coins and medals are rare, and their value in the study of history is great. Arrangement has been made to make this collection available for instruction in the university, and for this purpose it has been placed in charge of the professor of history, Dr George P. Garrison.

University of Texas mineral survey, Austin. William B. Phillips, *director;* Benjamin F. Hill, *assistant geologist;* H. W. Harper, *chemist;* O. H. Palm and S. H. Worrell, *assistant chemists.*

Paleontology. Collections specially rich in the fossil remains of the Carboniferous, Permian, Cretaceous and Tertiary.

Mineralogy and geology. Collections include ores of iron, copper, gold, silver, tin, lead, zinc, manganese, uranium and mercury. There has recently been added a complete set of crude oils found in the state and the products refined from them. There is a full set of the various types of rocks occurring in the state, including building and ornamental stones, some of them cut and polished. Asphalt, gypsum and salt horizons are well represented, as also materials for the manufacture of cement, tiles, sewer pipe, bricks, etc.

UTAH

University of Utah, Salt Lake City. R. H. Bradford, *curator*, in charge. This museum is for teaching purposes only, being supplemented by the collections of the Deseret museum at Salt Lake City.

Paleontology. 200 specimens: casts and models as purchased from dealers; miscellaneous collections of fossils.

Mineralogy. 2000 specimens: all the important groups in Dana's textbook.

Historic and economic geology and lithology. 500 specimens: models, charts, etc., and groups of specimens illustrating Tarr's *Economic geology of the United States;* United States government collection in lithology.

Zoology. 2000 specimens: mounted mammals, birds and reptiles; bird skins, alcoholic specimens.

Botany. 1200 dried plants of western United States; 500 European specimens.

Ethnology and anthropology. Scattered specimens.

VERMONT

Fairbanks museum of natural science, St Johnsbury. Delia I. Griffin, *director;* Mary E. Ide, *curator.*

Paleontology. Fossils from the various formations of the state, together with some casts of fossils.

Mineralogy. A small series of minerals and ores from the United States and abroad.

Lithology. A few hundred specimens, mostly from the United States.

Zoology. 4500 specimens: 36 species of mammals native to the state, some of which are mounted in groups to show their homes and habits, and a few from foreign countries; 700 North American and 1000 foreign birds, mounted, including 26 species of Paradiseidae; a small series of bird skins; 39 species of native and foreign reptiles and batrachians; 500 species of Lepidoptera and 1100 species of Coleoptera; and 1100 species of mollusks.

Botany. A herbarium of over 5000 specimens, chiefly phanerogams and vascular cryptogams, together with woods, fruits and grains.

Ethnology. Articles from the American Indians, Mexico, Egypt, South Africa, India, China, Japan, the Pacific islands, etc.

Numismatics and philately. A collection of 1500 ancient and modern coins, and over 2000 postage stamps.

The museum was erected, equipped and endowed by the late Franklin Fairbanks of St Johnsbury. It is free to the public and carries on an educational work in conjunction with the schools of the town.

Middlebury college, Middlebury. Edward A. Burt, *professor of natural history*, in charge.

Paleontology. The Adams collection, which is a general representation of the species from the different geologic formations; the Brainerd and Seely collection of fossils from the Champlain valley, which is particularly representative of the forms from the Chazy limestone. Additions to these collections have been made from several sources.

Mineralogy. A fairly complete set of minerals for the use of the classes.

Lithology. A set of the rocks of Vermont collected by Prof. Adams while conducting the geologic survey of the state; also a series of rocks of Minnesota.

Zoology. The Adams collection of shells, which includes the land and fresh-water shells of Vermont; a mounted collection of the native birds; and a marine collection, largely from the United States fish commission.

Botany. 2500 specimens: Brainerd collection of phanerogams and ferns of the Champlain valley said to lack about 50 species of comprising the full flora of the state; a set of Vermont mosses prepared by Dr Grout; 400 or 500 specimens of the basidiomycetous fungi of Vermont, now accumulating.

Ethnology and archeology. The Chapman collection of apparel and implements from the Yukon valley, Alaska; stone implements; several Assyrian tablets and casts, contributed by the Rev. Dr Farnsworth; and a series of relics of local and general historic interest.

The museum contains, primarily, collections illustrating the natural history of Vermont which have been made from time to time. They have been suitably arranged and cared for, so that they form an educational factor of value to the students.

University of Vermont, Burlington. George H. Perkins, *professor of natural history and curator of the museum;* L. R. Jones, *professor of botany*, in charge of the cryptogamic and local collections herbarium; C. G. Pringle, keeper of the herbarium, in charge of main herbarium; E. C. Jacobs, *professor of mineralogy*, in charge of the mineralogic collections. Student assistants are employed from year to year.

Paleontology. 5000 specimens particularly representative of Vermont formations: the Cambrian fauna from the Georgia slates and the red sandrock of western Vermont; the Calciferous fauna from various localities, including a nearly complete set of the Fort Cassin fossils described in bulletins of the American museum of natural history; the Trenton, Chazy and Black river fauna from various parts of the Champlain valley; and the Brandon lignites with carpolites, etc., from the Tertiary formations; specimens from America or Europe illustrating all the principal epochs.

Cambrian, Trenton and some Calciferous fossils for exchange.

Mineralogy. 5000 specimens: a good general collection of American and European minerals, including some very fine specimens; numerous specimens of Sicilian sulfur, celestite, etc., collected by the Hon. George P. Marsh.

Lithology. 2000 specimens: a series of the marbles and other metamorphic rocks of Vermont; a series of several hundred speci-

mens of the lavas of Vesuvius; and a large series of European rocks.

Zoology. 20,000 specimens: a series of the mammals of Vermont; a small series of skeletons and craniums of vertebrates; several hundred mounted birds, many of which are in their finest plumage, specially complete series of ducks, including a fine male specimen of the extinct Labrador duck; a collection of birds eggs; a series of mounted specimens of Lake Champlain fishes; a series of 6000 insects; a large collection of mollusks; and a considerable number of alcoholic specimens of reptiles, fishes, crustaceans and worms; a group of nine beavers from 6 weeks to 3 years of age, arranged to show the animal in its natural haunts, with a full sized section of a lodge, part of a feeding ground, 13 feet of a dam and a representation of a part of the pond. The materials were collected by Mr W. E. Balch of Lunenburg, in northern Maine, and the work has been done by him with the utmost fidelity to nature.

Botany. About 70,000 specimens; of these some 50,000 are the Pringle herbarium which represents pretty completely, for the vascular plants, the known flora of North America together with a majority of the European species and a good showing from other parts of the world. It is specially rich in Mexican specimens collected by Mr Pringle. The remainder of the collection consists largely of Vermont plants. It includes the herbariums of C. C. Frost and Joseph Torrey and an almost complete representation of the more recent collections of Gront, Eggleston and other Vermont botanists. The aim is to make the collection as broadly and completely representative of the Vermont flora as possible.

Vermont and Mexican specimens are available for exchange, chiefly ferns and seed plants.

Ethnology and archeology. 10,000 specimens: a large series of specimens illustrating Vermont archeology; collections of stone and earthenware utensils from the Mississippi valley, the Colorado cliff ruins, Central America and Peru; arms, implements, etc., from the Pacific islands, Australia and Africa; a very fine collection of Sioux weapons, articles of apparel and ornaments, etc.; an interesting collection of Japanese arms and

armor, and of English swords of the 16th and 17th centuries, halberds, guns, etc.; and a unique and superb collection of oriental (chiefly East Indian) carvings, embroideries, weapons, etc. which are exhibited in a room fitted up in oriental style—the walls hung with costly embroidered fabrics and furnished with carved teak wood. This collection is a recent legacy. There is also a very good collection of Greek and Roman coins and of modern medals and coins from most of the countries of the world, several thousand specimens in all.

In collecting and arranging the specimens the chief objects aimed at are to illustrate the lectures on natural history and so to make the museum a valuable adjunct of classroom work, and to illustrate the natural history of the state of Vermont.

Vermont state cabinet, Montpelier. George H. Perkins, *state geologist*, in charge. The museum is designed to be mainly local, illustrating in all its branches, the natural history of the state. It contains for the most part, Vermont specimens, though these are supplemented to some extent, by specimens of groups not found in the state, e. g. corals etc.

Palæontology. 500 specimens: a series of Cambrian fossils from Highgate and Georgia Vt., including fine examples of the Parker ledge, Olenellus, Mesonacis, etc.; a representative series of Calciferous (Fort Cassin), Chazy, Trenton and Utica fossils of western Vermont, Lake Champlain region; an extensive series of the Carpolithes etc. from the Tertiary Lignite of Brandon; also a nearly complete skeleton of Delphinapterus leucas (Beluga vermontana); two mastodon tusks nearly complete from the Champlain clay and other Quaternary fossils. The whole number on exhibition is not large because of lack of case room.

Mineralogy. 2000 specimens: a good collection of Vermont species, specially quartz, actinolite, calcite, ores of iron, lead, copper and manganese; also many other species less fully represented.

Historic and economic geology. 5000 specimens: a complete series of the rocks of Vermont collected by the survey of 1856-60; also a nearly complete set of marbles, slates and granites showing the rough and polished surfaces.

Zoology. 2000 specimens: a nearly complete set of the mammals and birds which are or within 50 years have been resident in the state; an alcoholic collection of reptiles and batrachians and a small collection of insects found in Vermont; a collection of several hundred Lepidoptera from other parts of New England and the tropics mounted on Denton tablets; also small but very good collections of corals and mollusks and 100 crania of mammals and birds.

Botany. 1500 specimens: a set of native plants collected and mounted by Mr C. G. Pringle.

Ethnology. 200 specimens: stone, copper and earthenware objects from various localities in the state.

VIRGINIA

Emory and Henry college, Emory. Small collections of rocks and minerals.

Roanoke college, Salem. No report.

State museum, Virginia military institute, Lexington. Hunter Pendleton, *professor of chemistry*, and N. B. Tucker, *professor of mineralogy and geology*, in charge.

Paleontology. 720 specimens collected from the various geologic formations; richest in fossil plants from the Coal Measures, and mollusks of the Tertiary system.

Mineralogy. 3525 specimens: a general collection of 2350 specimens; a fairly complete collection of 1175 Virginia minerals; minerals of the different counties of the state specially the tin, iron and manganese ores from Rockbridge and Augusta counties; also a series of gold and silver ores from the Cripplecreek, Aspen and Leadville districts of Colorado.

Lithology. 386 specimens: collection illustrating the metamorphic and igneous rocks of the Appalachian system; also collection of rocks illustrating: 1) unaltered sedimentary rock of mechanical origin; 2) unaltered sedimentary rocks of chemical origin; 3) unaltered sedimentary rocks of organic origin; 4) unaltered igneous rocks; 5) metamorphic sedimentary rocks; 6) metamorphic igneous rocks; 7) residual rocks.

Economic geology. Marbles and building stones; collections illustrating the products and byproducts of brine; dressed orna-

mental stones; products and byproducts of petroleum and mineral paints.

Zoology. 1500 specimens: molluscan shells, with a very few representatives of the other subkingdoms.

The museum also contains specimens illustrating tobacco from the crude leaf to various manufactured products; the manufacture of cotton and linen fabrics; various iron and steel products; oils and varnishes; artificial stones and stonework; silks and their dyestuffs; rubber in various stages of manufacture; fertilizers; products from the Rumford chemical works; powders, and other industrial products. There is also a series of 288 materia medica specimens.

University of Virginia, Lewis Brooks museum, Charlottesville. William M. Fontaine, *professor of natural history and geology.*

The museum has no staff apart from the professor teaching the subjects illustrated in it. Each professor has charge of his own department.

Paleontology. 8000 fossils illustrating the life of all formations, particularly forms from the Triassic, Jurassic and Cretaceous; a number of restorations, both life size and reduced, of large vertebrates, either entire or in part; and a number of plaster casts of famous fossils.

Mineralogy. 4000 specimens: a large general collection; series of specimens illustrating phenomena, color, structure and physical properties; a collection of models of meteorites; models of gold nuggets; imitation gems and a set of crystal models.

Historic geology and lithology. Lavas of Vesuvius; typical rocks from the Alps; a series of typical rocks of the New York formations, and from Auvergne, Paris Basin, Saxony and Virginia; an historic series from the different formations, and illustrative collections of igneous, metamorphic and fragmental rocks and a set of relief maps.

Economic geology. 4500 specimens: ores of Virginia; foreign (chiefly Italian) and domestic marbles, and a collection of building stones.

Zoology. 5000 specimens fully illustrating all the principal animal groups: mounted specimens; skeletons; alcoholic prepara-

tions; plaster models of many forms; enlarged models in wax of polyps, etc.; a large series of corals, dried specimens, etc.

Botany. 30,000 specimens: herbariums of Europe, North America, West Indies and Syria; collections of fruits and models of them; woods; dissected models of fruits and flowers; and pressed specimens of typical plants with engravings of their parts.

Ethnology and archeology. Collections very small.

The museum is composed of specimens intended strictly for illustrating the principles of the sciences taught, the aim being to give full representation of the natural objects. It is strictly a teachers museum.

Virginia polytechnic institute, Blacksburg. Ellison A. Smyth, in charge of natural history museum; John Spencer, *state veterinarian*, veterinary department; Robert C. Price, *mineralogy;* W. B. Alwood, *state entomologist*, in charge of fungi, scale insects, etc. in station building.

Mineralogy. 900 species: the various groups of ores (oxids, carbonates, sulfids, silicates, etc.); metals of economic value; minerals of industrial importance.

Historic and economic geology and lithology. 800 species: various classes of rocks and different formations; an educational series presented by the United States geological survey.

Zoology. 1200 North American bird skins; a small collection of mounted birds; shells, marine invertebrates, etc., sufficient to illustrate the work of the institute in zoology; on deposit for an indefinite time, 3500 species, 25,000 specimens, rich in the genus Papilio (236 species) and the Sphingidae (145 species) of native and exotic butterflies and moths; the station collection of native insects, rich in Orthoptera and Coleoptera, containing 4000 species and 10,000 specimens, 60 species being scale insects on 125 different host plants; 1000 histologic slides; 50 species of alcoholic snakes, lizards, etc.; skulls of alligator, turtle, porpoise, cat, dog, etc.; mounted skeletons of monkey, sheep, dog, cat, horse, cow, squirrel, birds, turtle, fish, etc.; a large lot of animal parasites in alcohol and microscopic specimens.

Lepidoptera for exchange.

Botany. 3000 species of spermophyta and ferns; 550 specimens of fungi; seeds of native weeds.

WASHINGTON

Ferry museum, Tacoma. Meriden S. Hill, *secretary*, in charge.

Paleontology. 150 specimens.

Mineralogy. 250 specimens.

Historic geology and lithology. 50 specimens.

Zoology. 50 specimens.

Ethnology. 200 specimens. Also large collections of paintings, etchings, engravings, photographs, old books, armor, coins, statuary, curios and articles of virtu.

State agricultural college, Pullman. C. V. Piper, *professor of botany and zoology;* Solon Shedd, *professor of geology and mineralogy;* R. H. Snodgrass, *assistant professor (entomology);* H. S. Davis, *assistant in vertebrate zoology;* R. K. Beattie, *assistant.*

Paleontology. 1000 specimens, general study collection.

Mineralogy. 800 specimens.

Lithology. 600 rocks.

Zoology. 5000 specimens of mammals, birds, mollusks, echinoderms, etc. 100,000 insects. Insects and mollusks for exchange.

Botany. Herbarium contains 40,000 sheets of phanerogams and pteridophytes, 2500 bryophytes, 5000 fungi, 200 algae. Phanerogams, bryophytes and fungi for exchange.

Ethnology. 500 specimens stone implements, etc. There are also collections illustrating agriculture, horticulture and veterinary science, pathologic and anatomic specimens.

Tacoma academy of science, Tacoma. Museum in charge of the secretary, Meriden S. Hill, who is also secretary of the Ferry museum.

Geology. 500 specimens.

Ethnology. 1000 specimens.

University of Washington museum, Seattle. Henry Landes, *state geologist*, in charge.

Paleontology. 2000 specimens of invertebrate fossils from Silurian formations; 1500 specimens of miscellaneous material derived from various sources, including the skull of an Alaska bison, etc. Specimens of Cretaceous and Tertiary invertebrates and plants from the Coal series for exchange.

Mineralogy. 4000 specimens of Washington minerals, arranged according to Dana.

Economic and historic geology. 2000 specimens of ores of gold and silver; other ores, such as iron, copper, lead etc., 600; minerals, 2500; coals, including all varieties, 100; building stones and clays, 50; 300 specimens illustrative of the state's geology.

Zoology. Small collection of mounted mammals, mostly local species; considerable collection of mounted birds, mostly indigenous species or from Alaska; 100 specimens of mounted fishes; fairly complete series of the marine invertebrates of Puget sound, specially Mollusca and Echinodermata; miscellaneous collection of marine invertebrates from various parts of the Pacific coast and elsewhere; a collection of many thousands of insects. Limited number of specimens for exchange.

Botany. 4000 specimens from Washington; 500 from Michigan; 2000 from Alaska.

Ethnology and anthropology. Material collected by the state for exhibition at the World's Columbian exposition and afterward donated to the museum. It illustrates the industrial life of the local Indian tribes.

Vashon college, Burton. No report.

WEST VIRGINIA

West Virginia university, Morgantown. S. B. Brown, *curator.*

Palcontology. 2000 specimens: 500 genera, 700 species; coal plants and other Carboniferous fossils well represented; the original fossil plants from which the plates in the volume on the Permian flora of Pennsylvania were made.

Mineralogy. 1300 specimens, 400 mineral species. Economic minerals well represented.

Historic and economic geology and lithology. 500 specimens: building stones and mining exhibits.

Zoology. Working collections.

Botany. 3000 specimens: mainly the flora of West Virginia.

Ethnology and anthropology. 500 specimens: ancient stone weapons and utensils.

WISCONSIN

Beloit college, Logan museum, Beloit. George L. Collie, *curator.*

Palcontology. 1500 specimens including fossils from all the geologic periods. The Trenton group is well represented, as a fine section of the Trenton limestone is exposed at Beloit, and the collection contains many type specimens from these strata. The Mesozoic formations are also well represented by European forms, mainly ammonites; the Tertiary by European forms. Many specimens from the Trenton group for exchange; also material from the Mesozoic and Tertiary of Europe.

Mineralogy. 600 specimens designed to illustrate as fully as possible Dana's *Textbook of mineralogy*, and particularly rich in quartz and calcite, mainly from Wisconsin. Calcite is the only material offered for exchange.

Historic geology. Ward's series of typical specimens from New York state.

Lithology. The series of specimens issued by Krantz of Bonn illustrating Rosenbusch's *Manual*, and that issued by Sturtz of Bonn, illustrating the typical massive rocks; also a series issued by Kuntze of Iowa City illustrating typical American localities has been added recently.

Economic geology. 800 specimens: a series of specimens illustrating the chief ore bodies of the west; a large collection of ores obtained from the World's Columbian exposition, illustrating the occurrences in Australia, Canada and Turkey. Many duplicates of ores from various parts of the world for exchange.

Zoology. The Williard zoologic collection of 1000 specimens, representative of the birds, and to a less extent of the mammals of Wisconsin; 200 species of birds eggs in storage; and a large collection of shells not well labeled. Many bird skins for exchange.

Botany. 1500 specimens: a herbarium of Wisconsin flowering plants; the Ellis collection of fungi.

Ethnology. 2500 specimens: a large number of mortars and pestles, and mealing stones; Mound Builders and modern Mexican pottery; aboriginal tools, spear and arrowheads, among which are many obsidian pieces; numerous articles of adornment, pipes,

war clubs, hammers, axes, etc., a few copper implements, including two Aztec copper bells; Indian clothing and implements; some bone implements from remains of the Lake Dwellers, and stone and bronze implements from European localities; also a collection of 3500 coins and 112 casts of antique Grecian sculpture.

On the exchange list are arrow and spearheads from various localities, obsidian flakes from Mexico, perforated stones from South Africa, pottery from New Mexico and Arizona, broken pottery, etc. from the shell mounds of Japan, and Cliff Dwellers pottery.

The museum also possesses a large collection of postage stamps.

Lawrence university museum, Appleton. D. P. Nicholson in charge.

Paleontology. Small collection of fossils representing the Devonian, Silurian and Ordovician.

Mineralogy. Fair working collection of minerals and rocks.

Geology. A duplicate set of the collections made by the state geological survey of 1879 and some succeeding years.

Zoology. 150 mounted animals and bird skins, and a set of shells, all collected by Dr J. J. Brown of Sheboygan, and amounting to several hundred species with a considerable number of duplicates.

Ethnology and anthropology. Collection of miscellaneous curios.

Milton college museum, Milton. Ludwig Kumlien is in charge of the museum, except the ethnologic collections, which belong to Willis P. Clarke.

Paleontology, mineralogy and geology. 4000 specimens not well arranged and grouped, of a wide distribution, though Wisconsin is best represented.

Zoology. 30 mounted specimens of as many species of Wisconsin mammals; 400 mounted specimens of Wisconsin birds; 200 specimens, mostly alcoholic, of Wisconsin reptiles, amphibians and fish; 500 alcoholic specimens of marine invertebrates, and 2000 insects. A private collection of more than 6000 skins of animals and birds, also one of the eggs of 500 different species

of birds, are accessible to the students. Bird skins, birds eggs, and Wisconsin mammals for exchange.

Botany. A herbarium of 2000 species, nearly all Wisconsin forms, and mostly from Rock county; 200 to 300 mounted specimens of arctic algae and lichens.

Ethnology. A private collection, general in scope, of several thousand specimens, but more representative of the Wisconsin Mound Builders than of any other people or time.

The museum is for the purpose of giving to students an opportunity to study, as far as is possible, the entire range of natural science, and contains various skeletons, preparations, etc., not enumerated above. The mounted specimens are mostly local, except the private collections mentioned.

Milwaukee public museum, Milwaukee. Henry L. Ward, *custodian and secretary;* Carl Thal, *assistant custodian and assistant secretary*; William B. Brickner, *special clerk;* Charles Brandler and George Shrosbree, *taxidermists;* John F. Fidlin and Paul C. Rohde, *taxidermist apprentices;* Herbert Clowes, *landscape modeler;* Charles E. Brown, Hans Sauer, Olive C. Wheeler and Lydia Nehrling, *attendants.*

Palcontology. 14,459 specimens, the Niagara and Hamilton groups being best represented.

Mineralogy and geology. 6419 specimens.

Historic geology. Stratigraphic and paleontologic series included in enumerations above.

Zoology. 160,005 specimens: collections of mammals, birds, reptiles, fishes, shells, butterflies and beetles, corals, sponges, etc.; mounted groups of Wisconsin and North American birds and mammals are given special prominence with some extralimital species such as orang-utans, etc., also shown in groups.

Botany. 20,656 specimens: illustrating the flora of all parts of the world, but specially of Wisconsin.

Anthropology. 27,144 specimens.

Library. 9258 bound books and volumes of pamphlets, all treating on natural history subjects.

Northwestern university, Watertown. No report.

Provincial seminary of St Francis, St Francis. Small general collection of 1500 specimens.

Ripon college, Ripon. C. Dwight Marsh, *professor of biology*, in charge; W. S. Leavenworth, *professor of chemistry and physics*, in charge of mineralogic collection.

Paleontology. 1000 specimens, mainly from New York and Wisconsin, including one of Prof. Chamberlain's duplicate collections made by the Wisconsin geological survey.

Mineralogy. 2000 specimens forming a fairly complete typical series of mineral species and including the Barber collection of material, chiefly from New England; the Walcott collection, mainly from New England and New York; also a specially good collection of Lake Superior copper ores and Wisconsin iron ores.

Lithology. Not extensive.

Zoology. Collections are representative of most divisions of the animal kingdom. The best are those of echinoderms and crustaceans. There is a specially large collection of microscope slides and alcoholic specimens of Copepoda. Some material for exchange.

Botany. 1500 specimens of phanerogams and ferns.

Ethnology. A few stone and copper implements from Wisconsin.

University of Wisconsin, Madison. E. A. Birge, *acting president;* William H. Hobbs, *mineralogy and petrology;* J. Morgan Clements, *geology and paleontology;* William S. Marshall, *zoology*; W. S. Miller, *vertebrate anatomy;* R. A. Harper, *botany.* The university museums comprise the geologic and mineralogic museum, the biologic museum and herbarium which occupy respectively the second and third floors of the south wing of Science hall.

Paleontology. Collections include that of the Wisconsin Academy of sciences, arts and letters, containing the type fossils described in the volumes of the first geological survey of Wisconsin; the Powers collection of Wisconsin Silurian fossils; and the systematic collection of fossils and casts of fossil forms belonging to the university. The type fossils of the Wisconsin academy are arranged in a special case in the geologic and mineralogic museum; the other specimens are systematically distributed in a number of cases.

Mineralogy. 34,100 specimens: the Henry collection of 30,000 specimens, which is particularly rich in minerals from the zinc and lead region of southwestern Wisconsin; a systematic mineral collection of 3000; and a systematic collection of crystals numbering 1000; also 100 oriented sections of minerals.

Economic geology. A metallurgic collection of 5000 specimens is exhibited.

Geology and lithology. 26,930 specimens; 13,900 microscopic slides: a set of the Rosenbusch collection of typical rocks, chiefly European, with a number of microscope slides, 550 specimens; 600 sections from the type rocks of the Wisconsin geological survey; the Brooks collection of 150 specimens from the Menominee region of Michigan; 230 from the Archean formations of Missouri; a general collection of 1000 crystalline rocks; a series of 500 Cambrian and post-Cambrian rocks and relief models to illustrate geologic and topographic features.

In Science hall, in condition for easy reference, is a large collection of rocks from representative crystalline areas of North America, belonging to the United States geological survey. The collection numbers over 40,000 specimens and 16,000 thin sections. Of these, 30,000 specimens and about 12,000 thin sections are of rocks from the Lake Superior region; 3000 specimens and 300 thin sections of New England crystallines; and the remainder from other typical crystalline areas of North America. In this building there is also located the following collections; 1500 specimens, chiefly from European localities, and 1000 microscopic slides in the private collection of crystalline rocks of the professor of mineralogy and petrology; special collections of engineering specimens and the collection of Wisconsin clays and building stones made by the Wisconsin geological survey.

Zoology. 50 skeletons and skulls; 80 mounted birds and about 100 skins; 100 species of echinoderms; 75 specimens of invertebrates; 1400 species of shells; both Ward's and Blaschka's series of models of invertebrates; and a good set of embryologic models; also good set life histories of insects both alcoholic and dry.

Botany. 10,000 sheets of phanerogams and vascular cryptogams from outside the state, and 3000 to 4000 sheets from with-

in the state; 7000 labeled specimens of Musci, including all the more important American forms; large collections of fleshy and parasitic fungi; a few exsiccatae of American algae and lichens; a small series of American woods; a small series of Brazilian woods; Hough's sections of American woods, and a number of papier-maché models illustrating the organs and structure of flowering plants.

Wisconsin academy of sciences, arts and letters, Madison. Ernest B. Skinner, *secretary.*

This academy has no natural history collections except a few fossils which are included in the collections of the University of Wisconsin.

WYOMING

University of Wyoming museum, Laramie. Wilbur C. Knight, *curator.*

Paleontology. 3000 specimens: good collection of the invertebrates from the Jurassic and Cretaceous formations of the Rocky Mountains of the United States; one of the largest collections of Jurassic dinosaurs from American localities in the world and the largest collection of Western Jurassic swimming saurians known. This collection contains type material as follows: Ceratodus americanus and robustus. Megalneusaurus rex, (type genus and species); Cimoliosaurus laramiensis; Plesiosaurus shirleyensis and Cycadella, a new genus of fossil cycad and 21 species. There is a lot of material in the Jurassic collection awaiting description. Duplicates of vertebrates and invertebrates offered for exchange.

Mineralogy. 700 specimens. Duplicates of Wyoming minerals for exchange.

Economic geology and lithology. 1700 specimens the most of which relate to the formations of the Rocky Mountains. Duplicates of Wyoming rocks for exchange.

Zoology. 850 specimens; in this collection there are about 550 bird skins representing the fauna of Wyoming.

Botany. The Rocky Mountain herbarium, Aven Nelson, curator, contains 40,000 specimens and the greatest number of

Rocky Mountain plants in any herbarium west of the Mississippi river.

Ethnology. 420 specimens of relics of the aboriginal inhabitants of Wyoming.

CANADA

BRITISH COLUMBIA

Provincial museum, Victoria. John Fannin, *curator;* F. Kermode, *taxidermist;* D. Withrow, *caretaker;* E. Anderson, *floorwalker.*

Paleontology. 3076 specimens.

Zoology. 11,659 specimens.

Botany. 564 specimens.

Ethnology. 1663 specimens.

Owing to the limited space for exhibition, this museum does not make exchanges. It is reserved almost exclusively as a provincial museum.

MANITOBA

Historical and scientific society of Manitoba, Winnipeg.

Paleontology. A few interesting local fossils.

NEW BRUNSWICK

Natural history society of New Brunswick, St John.

This collection includes those of the Mechanics institute. These are kept separate, and include that of Dr Gesner (rocks, minerals and fossils) made when he was employed on the geologic survey of New Brunswick; also some of Hartt's fossil insect types.

University of New Brunswick, Fredericton. L. W. Bailey in charge.

Paleontology. Cambrian, Cambro-Silurian, Silurian, Devonian, Carboniferous, and Quaternary formations; fossils of New Brunswick. A number of types of Cambrian fossils described and named by Dr G. F. Matthew from the rocks of St John; the types of Devonian fossils established by Dawson and Hartt from Carleton near St John, and fishes from the shores of Bay of Chaleurs; fossil fishes, Devonian, from the Albert mines; various mollusks and starfishes and a large fresh-water fish, Quaternary; fossils from Nova Scotia, including Silurian, Eo-De-

vonian and Carboniferous; fossils of Canada, from collections of the geological survey; American fossils, chiefly from Cincinnati group, and Lower Carboniferous; European fossils, chiefly Mesozoic and Tertiary, obtained by purchase.

Mineralogy. A general collection; a special collection of New Brunswick minerals.

Geology. Collections of Canadian rocks, chiefly Laurentian (St Lawrence, Saguenay, etc.) and Huronian; New Brunswick rocks, one series arranged according to age; another as illustrative of counties.

Zoology. The zoologic collections consist of 1) skulls of man, Quadrumana, Carnivora, Herbivora, Cetacea, Rodentia, Insectivora—with a few entire skeletons; 2) a small collection of mounted birds and mammals; 3) a collection of birds eggs identified and catalogued by Tappan Adney, New York; 4) about 200 numbered and catalogued fishes in alcohol from collections of United States fish commission; 5) a collection of marine invertebrates in alcohol from collections of United States fish commission; 6) collection of marine invertebrates, crustaceans, echinoderms, corals and sponges from Museum of comparative zoology, Cambridge Mass. and National museum, Washington D. C.; 7) a general and special conchological collection; 8) a collection of reptiles in alcohol from Boston society of natural history.

Botany. The botanical collections consist of 1) a collection of New Brunswick phanerogams and ferns, made by Dr James Robb and arranged on the Linnaean system; 2) a collection similar to the above but made by Prof. L. W. Bailey and arranged upon the natural system; 3) a collection of North American phanerogams from the herbarium of Prof. W. W. Bailey, Providence R. I.; 4) a collection of mosses, lichens and fungi; 5) a collection of diatoms, confervae, etc. mounted for the miscroscope.

None of the above collections are large, and additions to any of them would be very welcome.

Archeology. Collections of prehistoric relics from New Brunswick; stone weapons and utensils, pipes, pottery, etc.

NEWFOUNDLAND

Museum of the geological survey of Newfoundland. *See* Addenda, p. 223.

NOVA SCOTIA

Acadia college museum, Wolfville. Ernest Haycock in charge.

Paleontology. 500 to 600 specimens: a working collection representing all geologic horizons, but richest in Carboniferous and Devonian forms; a cabinet collection put up in England, representing in a manner the whole range of English geology, and a collection of corals from Ontario, and Silurian forms from Gaspé and Anticosti.

Mineralogy. Several hundred specimens: a collection of several hundred from Ottawa; a large collection purchased of Ward & Howell; and a series of the zeolites from the trap rocks of Nova Scotia.

Historic geology and lithology. Series of specimens illustrating the rocks of New York state and typical rocks from all parts of the world, purchased of Ward & Howell; and a representative series of Canadian rocks.

Economic geology. 300 specimens: ores purchased of Ward & Howell; and collections of gold-bearing quartz, antimony sulfid, manganese dioxid and other ores of Nova Scotia.

Zoology. A few mammals of Nova Scotia; a small collection of birds; a large collection of unios and specimens of shells of nearly all the marine orders.

Botany. A herbarium containing many species of plants of Nova Scotia and New Brunswick, prepared by G. U. Hay, of St John, New Brunswick.

Ethnology. Indian arrowheads and axes; bows and arrows from the Canadian northwest, and from India; weapons and domestic utensils from India and Burmah, and numerous articles from all parts of the world, specially from Hudson bay region and from China and Japan.

This museum is considered the most instructive and attractive in Nova Scotia.

Dalhousie college, Halifax. No report.

King's college, Windsor. Prof. Vroom, *acting curator.*

Paleontology. W. B. Almon collections, a few fossils from Scotland; Silurian and Devonian fossils from Arisaig, N. S.; a small collection of Australian fossils and Silurian and Devonian

fossils from Great Britain. The museum has a few specimens for exchange.

Mineralogy. A good collection of Nova Scotia minerals.

Historic and economic geology and lithology. A fair working collection.

Zoology. The museum has nothing of importance in this department.

Botany. Cogswell herbarium, phanerogamous and cryptogamous plants of Great Britain; Ball herbarium, 250 Nova Scotia plants; Strange herbarium, plants from India; Gossip herbarium, small collection from Scotland; McMorine herbarium of over 1000 Canadian and United States plants.

Ethnology. This collection consists of Maori clothing, Zulu weapons and Tahiti carved work.

A few specimens of historical (provincial) interest are also contained in the museum.

Provincial museum, Halifax. Harry Piers, *curator.*

Paleontology. Nova Scotian fossils, chiefly Carboniferous; specimens illustrating the late Dr D. Honeyman's writings and some type specimens.

Mineralogy. A general collection and a special (Nova Scotian) collection. Zeolites well represented.

Historic and economic geology and lithology. Collections illustrating local (Nova Scotian) historic and economic geology and lithology and specimens illustrating the late Dr D. Honeyman's writings on the geology of Nova Scotia. Also a general lithologic collection.

Zoology. Collections of Nova Scotian mammals, birds, birds eggs, reptiles, batrachians, fishes, and invertebrates. Also type specimen of Sthenoteuthis megaptera (Verrill) (large broad finned squid).

Botany. An herbarium of Nova Scotian plants (including some algae); collection of Nova Scotian woods; large series of water-color paintings of Nova Scotian wild flowers; Nova Scotian grains, grasses and fruits.

Ethnology and anthropology. Relics of the stone age in Nova Scotia; specimens illustrating the implements etc., at present used by the Micmac Indians. Foreign ethnologic and anthro-

pologic material is at present stored in boxes for want of room for their proper display.

There are also in this museum specimens illustrating various industries of Nova Scotia; numismatic collection (ancient and modern coins and casts) with descriptive manuscript catalogues; some local historic specimens; and a few oil portraits of merit. Connected with the museum is the Provincial science library.

ONTARIO

Geological survey of Canada, Ottawa. Robert Bell, *acting director.*

The most complete collection known of specimens illustrative of Canadian geology, zoology, botany, archeology and ethnology.

Palæontology. 16,000 Canadian specimens classified and exhibited, representing 4600 species, 1000 of which are types described by E. Billings, and about 400 types described by J. F. Whiteaves; a number of types of Cretaceous and Tertiary plants described by Sir J. William Dawson; Cretaceous vertebrates described by Prof. H. I. Osborn and Lawrence M. Lambe; also types of species established by Prof. E. D. Cope, Dr S. H. Scudder, Prof. T. Rupert Jones, A. H. Foord, Prof. H. A. Nicholson, E. O. Ulrich, W. R. Billings and others; unique collection of Ordovician crinoids, etc., from Ottawa and vicinity; Devonian fishes from the Bay of Chaleurs; original specimens of Eozoon canadense.

Mineralogy and lithology. 7000 Canadian specimens catalogued and on exhibition; Madoc and Thurlow meteorites.

Zoology. Representative specimens of nearly all the known birds and mammals of Canada.

Botany. The most complete herbarium extant of Canadian plants. A collection of the woods of Canada and of photographs of her forest trees.

Hamilton scientific association, Hamilton. The association has some interesting local fossils.

Kingston school of mining, Kingston. The museum is in charge of the several professors of geology and mineralogy.

Paleontology. The collection of Canadian fossils which was exhibited at the World's Columbian exposition by the geologic

survey department of Canada, and afterward presented to this school.

Mineralogy. 10,000 specimens, specially arranged to illustrate the lectures on descriptive, physical, and economic mineralogy. Many duplicates for exchange, including zircon, sphene, apatite, etc.

Historic geology and lithology. 4000 or 5000 specimens. Many duplicates for exchange.

This institution is affiliated with Queen's college, and the collections are used jointly.

Ontario agricultural college, Guelph. James Mills, *president;* William Lockhead, *curator and professor of biology and geology.*

The museum consists of a series of cases containing the most important minerals found in rocks; a series of 16 cases representing the characteristic fossils found in the geologic systems represented in Canada.

Perth collegiate institute museum, Perth. William Hardy, *principal of the institute*, and H. S. Rosevlar, *science master*, in charge.

Paleontology. Some trilobites, lamellibranchs and brachiopods from the Devonian formations; some Silurian cephalopods and other material, as yet unclassified.

Mineralogy. 400 specimens: iron and copper ores from eastern Ontario; copper and nickel ores from Sudbury; phosphate, mica and asbestos from the Perth district, and specimens of nearly every variety of silicates from the Laurentian district near Ottawa.

Lithology. 800 specimens: chiefly of massive eruptive and crystalline rocks; also a collection of concretionary forms.

Botany. 300 specimens of the flowering plants of eastern Ontario.

Provincial ethnological museum, Toronto.

Zoology. 400 specimens vertebrates, mollusks, insects of Ontario.

Botany. 500 specimens Ontario plants.

Ethnology and anthropology. 900 specimens representing Iroquois, Blackfoot, Blood and Kwakiutl Indians of Canada—Eskimo, Navajo, Zuni, Pima, Poma. Life masks of British Columbia and Washington Indians. Collections from China,

New Hebrides, Paraguay and Africa. 300 busts of European and United States scholars and celebrities. 2000 archeological specimens, photographs, paintings, etc. illustrative of people, mainly of Ontario, Mexico. Southeastern United States, Costa Rica and other countries are represented.

Queen's college and university museum, Kingston. James Fowler in charge.

Paleontology. 5000 specimens of general distribution.

Mineralogy. 3600 specimens from various sources.

Historic geology. The Rev. Andrew Bell collection of 1000 specimens illustrating a north and south stratigraphic section across the province from Lake Erie and a series of 500 specimens illustrating a stratigraphic section across the Ottawa river.

Lithology. An extensive collection which together with other collections in this department, is stored in the school of mining and agriculture in connection with the university.

Zoology. 3146 specimens: 26 mounted mammals; 130 mounted birds; 40 specimens of fishes; 200 alcoholic preparations and 150 dried specimens of invertebrates; small collections of reptiles and of insects, and 2600 mollusks.

Botany. 9450 mounted sheets: illustrating 1200 genera and 3650 species; a private herbarium of 14,731 sheets illustrating 2157 genera and 8650 species. Several thousand duplicates for exchange.

Ethnology. 500 specimens: a collection of Indian relics; a few hundred articles from China, Japan, the Pacific islands, Turkey, India and other countries.

University of Toronto, Toronto. GEOLOGICAL AND MINERALOGICAL MUSEUM. A. P. Coleman, *professor of geology*, curator; T. L. Walker, *professor of mineralogy.*

Paleontology. General collection for teaching purposes, 10,800 specimens. Pleistocene 2500 specimens, 227 species; the Townsend collection, 6400 specimens, 820 species. There is in addition a collection of fossils in the biological museum to illustrate systematic geology.

Mineralogy. 7125 specimens: Ferrier collection, 3700 specimens; general collection, 1400 specimens; students working col-

lection, 2025 specimens. The Ferrier collection of minerals is temporarily placed in the biological museum.

Petrography. 2810 specimens: 1440 Canadian rocks. 620 specimens in general collection and 750 specimens for students use.

Economic and structural geology. 390 specimens. Bureau of mines. Collection of economic rocks and minerals, 2000 specimens; building stones, 200 specimens; collection of 245 specimens to illustrate applied chemistry.

BIOLOGICAL MUSEUM. R. Ramsey Wright, *professor of biology*, in charge; B. A. Bensley, *assistant curator of zoological collections;* W. H. F. Addison, *temporary catalogue assistant;* A. Pride, *subcurator and preparator.*

Paleontology. A small collection of animal fossils, arranged in ascending series, as a diagram to the biologic student of the succession of the fossiliferous formations of Europe and America. Specimens and models of fossils are also incorporated in their proper systematic position, specially of such forms as have a high morphologic and philogenic interest.

Zoology. 1100 catalogue entries of mammals; 3500 of birds and 900 of reptiles. The museum is rich in models and preparations illustrative of anatomy and animal development.

Botany. Herbarium and collection of models, chiefly by Brendel. The space now temporarily occupied by the university mineral collections is to be devoted to botanical collections.

The museum is primarily intended to supplement the teaching in the biologic department. It affords a floor space of 7500 square feet.

ETHNOLOGICAL MUSEUM. G. W. Wrong, *professor of history*, in charge. This museum is in the main building of the university and contains a fair collection of skulls including ancient Egyptian and Roman skulls and models of famous skulls of importance in ethnologic investigations—The Neanderthal, Cro-Magnon, etc. There are paleolithic implements from the English and French drift. The feature of the greatest interest is the collection of stone implements from various parts of Canada, specially of the district in which Toronto is situated.

Victoria university museum, Toronto. N. Burwash, *president.*

Paleontology. 2000 species of European fossils principally purchased from Krantz, chiefly Corniferous to Quaternary. About 1000 species chiefly Paleozoic, of Canadian and United States formations.

Petrography. 500 specimens of European and Canadian rocks.

Mineralogy. 1000 specimens of European and Canadian minerals.

Anthropology. The museum also has a very fine meteorite weighing nearly 400 pounds worshiped by the Crees for many generations as a divinity, a small collection of Indian antiquities from Ontario, Manitoba and British Columbia, some from the Pacific Islands and a very valuable collection from Japan including ancient pottery, arms, musical instruments and articles illustrating the life of the aborigines of the northern islands and the old Japanese civilization.

A collection of Egyptian antiquities includes a mummy about 600 B.C., various ancient images, hieroglyphic inscriptions on stone, wood and papyrus, ancient glass and pottery.

The collection of Indian antiquities has been recently enlarged by the purchase of dress, arms, utensils, drums, conjurers implements, totems, stone implements and other material from the Piegans, Blackfeet and the Indians of Alaska.

QUEBEC

Laval university, Quebec. J. C. K. Laflamme, *curator.*

Paleontology. General collections illustrating all formations, specially rich in Canadian Silurian and Devonian forms which have been identified and arranged by E. Billings and Dr Ami. 400 Niagara fossils presented by C. C. Grant and a collection of the fossils of Quebec presented by Dr J. M. Ahearn. Mesozoic and Tertiary fossils including a collection from Paris presented by the Abbé Baret of Ablainville; casts of protichnitis from the Potsdam of Canada and reptilian tracks from Turner's Falls.

Mineralogy. 4000 specimens. The old Quebec seminary collection with many additions arranged by Dr Thomas Sterry Hunt. A collection made for the Quebec seminary by the Abbé Haüy. Collection of exclusively Canadian minerals and sets showing

hardness and other properties; a collection of crystals presented by the Paris school of mines.

Lithology. A collection of rocks from the Paris museum of natural history prepared by Stanislaus Meunier; collections of Canadian rocks.

Economic geology. Copper ores from eastern Canada; iron ores from Leeds, St Urbain and Saguenay; auriferous quartz from Beauce; crude and manufactured crysolite from Thetford and Coleraine and a series of Canadian phosphates.

Zoology. General collection including many Canadian mammals.

Botany. Herbarium of 10,000 specimens including collections from Canada and the United States; collections from the Northwest presented by the Canadian geological survey. There are also collections of woods from Canada, France and from the English markets. Models of edible and poisonous mushrooms and specimens illustrating abnormal development, natural grafts and vegetable diseases.

McGill university (Peter Redpath museum), Montreal. B. J. Harrington, *honorary curator.*

Paleontology. Collections of Sir J. W. Dawson, largely Carboniferous and Devonian fossil plants; Microsauria and post-Pliocene mollusks of Canada; many types of species of Eozoon.

Mineralogy and geology. Many fine Canadian and foreign minerals and rocks; the Holmes and Miller collections of minerals.

Zoology. The Carpenter collection of shells, and other collections illustrating various departments of zoology.

Botany. The university herbarium, including the Holmes herbarium and other special collections.

Montreal college, Philosophy house, Montreal.

Mineralogy. A collection of minerals made by the Abbé Haüy, similar to that at Laval.

Natural history society of Montreal, Montreal.

Paleontology. General collection of fossils.

Mineralogy. The C. U. Shepard collection of minerals of 4000 specimens, presented by Dr Holmes; many good specimens of old finds.

SYNOPTIC LIST OF MUSEUM COLLECTIONS

Numbers refer to specimens except as otherwise stated.

NAME	PAGE	PHYSICAL AND CHEMICAL GEOLOGY	MINERALS	FOSSILS	ZOOLOGY			BOTANY		ETHNOLOGY
					Insects	Other invertebrates	Vertebrates	Cryptogams	Phanerogams	
UNITED STATES										
Alabama										
Ala. polytechnic institute mus. Auburn	4	200	600	*a*		75		19 528	20 606	*a*
Geol. sur. of Alabama University	4	*b* 75 000	4 800	*c* 75 000	7 000		1 100	5 300		435
Arizona										
Univ. of Arizona Terr. mus. Tucson	5	3 000	2 500			1 500		10 000		*a*
Arkansas										
Hendrix coll. mus. Conway	5	72	800			100		3 500		
Univ. of Arkansas mus. Fayetteville	6	350	2 000	1 800		2 900				
California										
California academy of sciences	221	*a*	*a*			*d*		110 000		2 200
Golden Gate Park mus. San Francisco	6		2 322	2 000		24 000		404		3 416
Leland Stanford jr mus. Palo Alto	7	*e*	*e*	*e*		*e*		*e*	*e*	*e*
San Diego soc. of nat. hist.	8	*a*	*a*	*a*						
Santa Clara coll. mus.	8	2 300		1 000		400		1 500		*a*
State mining bureau, San Francisco	9		15 750							*a*
Univ. of California, Berkeley	9	*d*	*d*	*d*		*d*		*d*	*d*	*d*
Univ of Southern California, Los Angeles	12	1 000	3 700	2 950	*a*	20 350	1 000	3 100		730
Colorado										
Bureau of mines of Colorado, Denver	12	*a*	*a*	*a*						
Colorado scientific soc. Denver	13	500	1 000	400						
Colorado school of mines, Golden	13	1 800	29 000	2 440						

a Small collection. *b* Including fossils. *c* Including geology. *d* Large collection. *e* Collections not enumerated.

Synoptic list of museum collections (*continued*)

NAME	PAGE	PHYSICAL AND CHEMICAL GEOLOGY	MINERALS	FOSSILS	ZOOLOGY			BOTANY		ETHNOLOGY
					Insects	Other invertebrates	Vertebrates	Cryptogams	Phanerogams	
Colorado (*continued*)										
State agric. col. Fort Collins	13	*a*	*a*	50	40 000	.....	1 000	2 300	4 000	*a*
Univ. of Colorado mus. Boulder	14	1 500	1 175	500		600		4 000		*a*
Connecticut										
Connecticut agric. college, Storrs	15	750	700	500		10 000		1 000		75
Peabody mus. nat. hist. Yale, New Haven	15	*d*	*d*	*d*		*d*		*d*	*d*	*d*
Scientific ass'n of Meriden	16	1 200	2 000							
Trinity col. mus. Hartford	17	*a*	*a*	*a*		*a*		*a*	*a*	*a*
Wesleyan univ. Middletown	17	*a*	12 000	15 000		110 000		11 000		8 000
Delaware										
Delaware college, Newark	18	300	600	250		200		1 000		
Soc. of nat. hist. of Delaware, Wilmington	19	.....	1 500	.....	*a*	.....	400	50 000		*a*
District of Columbia										
Catholic univ. of America, Washington	19	.....	.....	.....	.....	.....	.....	.....	40 000	
Columbian univ. Washington	20	*a*	*a*	*a*		*a*		*a*	*a*	*a*
Georgetown univ. Coleman mus.	20	1 100	4 000	1 500		10 000		*f*	*f*	*a*
Howard univ. nat hist. mus. Wash.	20	.....	800	500		1 000		2 200		*a*
U. S. national museum, Washington	21	75 739	35 433	444 569	1 846 000	1 449 881	467 366	526 751		932 547
Florida										
[1]John B. Stetson univ. De Land	26	*a*	*a*	*a*		*a*		*a*	*a*	*a*
Georgia										
Emory college, Oxford	26	*a*	5 000	200		*a*		*a*		
Geol. survey (state museum) Atlanta	26	*d*	930	.....	.....	.....	.....	400		203

Mercer univ. Macon	27	6 000		2 500			400	300	200	500	
Univ. of Ga. Athens	28	*a*	*a*	*a*						*a*	
Idaho											
Univ. of Idaho, Moscow	28	*a*	1 000	250	16 000		270	*a*	10 000	100	
Illinois											
Augustana college, Rock Island	29	800	500	4 000	1 000	2 000			3 000	1 500	
Chicago acad. of sciences	29	1 000	3 500 350 species	10 000 1 550 species	20 000	75 000	*m*	5 700		1 000	
Chicago univ. Walker mus.	32	2 500	5 000	400 000	*d*	*d*	*d*	*d*	*d*	3 000	
Col. of liberal arts, N. W. U. Evanston	33	22 000	*d*	4 300		18 000	4 600	20 000		8 000	
Elgin scientific society	34	*a*	*a*	*a*							
Field Columbian mus. Chicago	34	12 000	11 000	7 000	10 000	*d*	*d*	150 000		*d*	
Ill. state mus. of nat. hist. and geol. sur. Springfield	39		2 500	5 000	*a*		*a*				
Ill. Wesl'n univ. Powell mus. Bloomington	39	*d*	*d*	*d*	1 000	15 000	1 000	1 000	6 000 species	1 140	
Knox College, Galesburg	41		1 250	2 100	2 000 species	2 500 species	400 species	20 000		150	
Lake Forest univ. mus	41			*a*							
Northwestern college, Naperville	42		600	300	*f*	*f*	*f*	14 000		350	
Taylor mus. Blackburn univ. Carlinville	42	75 cases	5 000	12 000	*a*	*a*	*a*	*a*	*a*	500	
Univ. of Ill. Champaign	43	6 000	10 900	45 000	70 000	11 000		40 000		800	
Indiana											
Franklin college, Gorby collection	44		1 000	35 000		1 000		*a*	*a*	300	
[2]Hanover col. mus	44	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	
Ind. univ. mus. Bloomington	45	1 500	1 000	5 000	3 000	10 000	*d*	500	1 000		
Purdue univ. Lafayette	45		1 000	4 000	6 000		6 000	5 000		1 000	
Taylor univ. Walker mus. Upland	46		1 000	500			100	*f*	*f*	300	
Wabash col. Hovey mus. Crawfordsville	46	400	4 000	4 300	10 000		825	1 500	30 000	6 000	
Indian Territory											
Indian univ. Bacone	47	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	

[1] 2500 specimens. [2] 500 specimens. *a* Small collection. *d* Large collection. *f* Local collection. *m* Complete local collection.

Synoptic list of museum collections (*continued*)

NAME	PAGE	PHYSICAL AND CHEMICAL GEOLOGY	MINERALS	FOSSILS	ZOOLOGY			BOTANY		ETHNOLOGY
					Insects	Other invertebrates	Vertebrates	Cryptogams	Phanerogams	
Iowa										
Amity col. mus. College Springs	48	1 000		2 000		500		100		200
Davenport acad. of sciences	48	*d*	*d*	*d*		*d*		*d*	*d*	*d*
Iowa col. Parker mus. nat. hist. Grinnell	48	*a*	1 000	2 000		3 000		1 500	2 500	*a*
Muscatine acad. of sciences	49	*g*	*g*	*g*		*g*		*g*	*g*	*g*
State univ. of Iowa, Iowa City	49		30 000			100 000		175 000		800
Upper Iowa univ. Fayette	50	100	500	1 000	100	250	250	9 000	3 000	125
Wartburg teachers sem. & acad. Waverly	50	352	1 434	938		1 128		1 151		452
Kansas										
Baker univ. mus. Baldwin	51	500	4 810	21 156	32 798	9 000	1 800	.....	7 789	900
Bethany college, Lindsborg	51	100	800	500		1000		1 500		2 000
College of Emporia, Emporia	52	200	300	.....	250	.....	250	250		
Kan. state agric. col. Manhattan	52		3 000		20 000	8 000				
Kan. Wesleyan univ. Salina	52	500	1 200	900	6 000	900	150	200		300
Midland col. mus. Atchison	53	500		800		120		1 000		*a*
Univ. of Kansas Lawrence	53	2 000	12 000	40 000		125 000		22 000		500
Washburn col. mus. Topeka	55	500	500	8 000		2 000		2 000		.....
Kentucky										
Kentucky univ. Lexington	55	200	500	500	.....	250	1 375	.....	.....	300
Louisville public library	56	500	6 000	1 000	.....	.....	3 000	*d*	*d*	500
Ogden col. Bowling Green	56	200	2 000	2 000	*a*	*a*	*a*			
State geol. dep't, Lexington	57	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*
Louisiana										
Louisiana state university, Baton Rouge	58	*a*	*a*	*a*	150 cases	*d*	*d*	2 000		
Tulane univ. Tulane mus. New Orleans	58	300	5 000	3 000	*d*	*d*	*d*	45 000		*a*

Maine										
Bates col. mus. Lewiston	59	*a*	*a*	*a*		*a*		*a*	*a*	*a*
Colby col. mus. Waterville	59	*a*	3 000	1 500		500		800		*a*
Kennebec hist. soc. Augusta	60	*a*	*a*	*a*		*a*		*a*	*a*	*a*
Univ. of Maine mus. Orono	60	600	600	1 000		2 500		15 000		150
Maryland										
Johns Hopkins univ. Baltimore	61	*d e*	*d e*	*d e*		*d e*		*d e*	*d e*	*d e*
Maryland acad. of sciences, Baltimore	63	*a*	5 000	500 000		*d*		1 500 species		10 000
Maryland geol. sur. Baltimore	64	*d*	*d*	*d*						
Rock Hill college mus. Ellicott City	65	50	2 000					2 500		800
Womans college museum, Baltimore	66	10 000	20 000	10 000		20 000		25 000		3 000
Massachusetts										
Amherst college	67	2 000	10 000	40 000		15 000		4 000		1 500
Boston soc. of nat. hist. Boston	68	4 000	5 000	22 847	50 000	42 475	29 387	85 280		
Cape Ann scientific & lit. ass'n, Glouc'str.	70		1 000			700		200		*a*
City lib. ass'n nat. hist. mus. Springfield	70	950	1 200	500		4 200		400		1 000
Clark hall & Thompson biological lab. Williams college, Williamstown	71	750	1 250	900		*a*		*a*	*a*	*a*
Harvard univ. mus. Cambridge	72	*d*	*d*	*d*		*d*		*d*	*d*	*d*
Leominster public mus. Leominster	75	*a*	700	50		200		710		
Massachusetts agric. col. Amherst	75	*a*	225	300	30 000	9 000		*a*	*a*	50
Massachusetts institute of tech. Boston	77	10 000	10 000	10 000						
Peabody acad. of science, Salem	77	*d*	*d*	*d*		*d*		*d*	*d*	*d*
Smith college museum, Northampton	79	*a*	*a*	*a*		*a*		*a*	*a*	*a*
Worcester natural history soc.	79	3 500	3 000	500	2 000	8 075	1 565	1 500		
Michigan										
Alma col. Francis L. Hood mem. mus	80	1 000	5 000	2 500		2 500		*a*	*a*	200
Detroit museum of art, Detroit	81[1]	300	3 000	5 000	8 000	60 700		3 000 species		3 500
Michigan college of mines, Houghton	81	18 248	35 756	5 000		800		300		250
Michigan geol. survey, Houghton	82	12 000		1 200						
Univ. of Michigan, Ann Arbor	82	800	6 000	95 040		*d*		70 000		*d*
Minnesota										
Carleton college, Northfield	84		2 000	12 000		1 000				
Gustavus Adolphus college, St Peter	84	1 000	500	800	1 000	500		5 800		700

[1] See also p. 222. *a* Small collection. *d* Large collection. *e* Collection not enumerated. *g* Collection destroyed by fire.

Synoptic list of museum collections (*continued*)

NAME	PAGE	PHYSICAL AND CHEMICAL GEOLOGY	MINERALS	FOSSILS	ZOOLOGY			BOTANY		ETHNOLOGY
					Insects	Other invertebrates	Vertebrates	Cryptogams	Phanerogams	
Minnesota (*continued*)										
Hamline univ. mus. of nat. hist. St Paul.	85	1 000	*a*	1 000	1 000	2 350	1 750	3 300		200
Minn. acad. of nat. science, Minneapolis.	86	500	2 500	1 500	1 500		4 800	.....	.....	1 500
Minn. geol. & nat. hist. sur. Minneapolis.	87	*h*	*h*	*h*	*h*	*h*	*h*	*h*	*h*	*h*
Univ. of Minnesota, Minneapolis	87	12 600	13 400	37 000	.....	.....	.....	275 000 sp'cim'ns; 4 000 jars		
Mississippi										
Millsaps college museum Jackson.....	88	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*
Miss. agric. & mech. col. agric. college...	88	.....	500		10 000	70	*a*	2 000	4 000	
Univ. of Mississippi mus. of nat. hist. & geol. University.....	89	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*
Missouri										
Bureau of geology and mines, Rolla.....	89		32 000							
Drury college, Springfield.....	89	1 500	1 500	2 500	850		300	400	1 400	*a*
Pritchett college museum, Glasgow.....	90	2 000		10 000	400		900	.....	500	350
Univ. of Mo. school of mines & metal. Rolla.	91	3 500	7 000	500						
Univ. of state of Mo. univ. mus. Columbia.	91	2 000	1 500	1 500						
Washington univ. mus. St Louis.....	92	7 000	10 000	20 000		15 000				
Montana										
Mont. col. of agric. & mech. arts, Bozeman.	92	.....	5 000	2 000		7 000		12 000		
Nebraska										
[1] Creighton univ. mus. Omaha	93	*a*	*a*	*a*		*a*	*a*	*a*	*a*	*a*
Doane college biol. & geol. mus. Crete...	93	.....	600	350		700	450	2 500		150
Univ. of Nebraska, state mus. Lincoln...	94	*d e*	*d e*	*d e*		*d e*	*d e*	*d e*	*d e*	*d e*

New Hampshire											
Dartmouth col. Butterfield mus. Hanover.	94	18 200	2 000	*a*	1 000 species	3 000	*a*	*d*	*d*	*a*
Keene high school museum	96	*a*	2 000	150		3 000		500		500
Keene nat. hist. soc.	97		1 000							
N. H. col. of ag. and mech. arts, Durham	97	5 000	1 500	300	20 000	500		2 000	4 000	
New Jersey										
New Jersey geol. sur. Trenton	97	*i*	*i*	*i*		*i*		*i*	*i*	*i*
N. J. state mus. Trenton	97		1 500	*d*		325		100		*a*
Princeton univ. museums, Princeton	98	5 240	76 000	5 000 species	20 000	*d*		*d*	*d*	3 000
Rutgers col. G. H. Cook mus. N. Brunsw'k	102	2 600	11 700	5 750	*d*	*d*	*d*	*d*	*d*	1 700
New Mexico										
N. M. col. of ag. & mech. arts, Mesilla P'k	103		500	200	*d*	50		3 000		
New York										
Alfred univ. mus. Alfred	104	*a*	1 600	1 500	2 000	20 000		6 000		5 000
Am. mus. of nat. hist. New York	105	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*
Brooklyn inst. of arts and sciences, B'kln	110	*a*	3 000	7 000	130 000	12 000	16 200	40 000		*d*
Buffalo soc. of nat. sciences, mus. & lib.	111	2 885	1 218	31 000	1 535	3 332	1 535	14 935		5 000
Buffalo state normal sch. mus	112	50	300	400			150	400		
Canisius college, Buffalo	113	550	800	1 000	2 500	450		1 600		
Colgate univ. mus. of geol. & nat. hist. Hamilton	114	*a*	*a*	*a*	1 300		1 400	2 700		*a*
College of the City of N. Y. New York	114	2 400	7 500	500		3 750		550		*a*
Columbia univ. mus. New York	115	*d*	25 000	50 000	*d*	*d*	*d*	500 000		
Cornell univ. mus. Ithaca	116	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*
Glen Island mus. of nat. hist. N. Rochelle	119				4 300		500	500		*a*
Hamilton college, Clinton	120	1 250	10 000	2 500	13 000	2 000	600	2 595	9 154	
Hobart college mus. Geneva	121	*a*	*a*	*a*		*a*				
Long Island hist. soc. mus. Brooklyn	121	*a*	*a*	292		2 000		4 000		1 600
Nat. sci. ass'n of S. I. New Brighton	122	*a*	200	*a*		600		3 000		
New York state museum, Albany	123	3 000	4 300	1 000 000	3 000 species	61 786	4 338	44 000		*d*
New York univ. University Heights	128	9 500		16 000		*d*				*d*
Niagara univ. museum	128		400	600		130		300		60
Polytechnic institute mus. Brooklyn	129	500	3 000	1 000		1 000				100

[1] 10,000 specimens. *a* Small collection. *d* Large collection. *e* Collection enumerated. *h* Listed under Univ. of Minnesota. *i* Collection in New Jersey state museum.

Synoptic list of museum collections (*continued*)

NAME	PAGE	PHYSICAL AND CHEMICAL GEOLOGY	MINERALS	FOSSILS	ZOOLOGY			BOTANY		ETHNOLOGY
					Insects	Other invertebrates	Vertebrates	Cryptogams	Phanerogams	
New York (*continued*)										
Rensselaer polytech. inst. mus. Troy	129	3 000	5 000	1 500	10 000		400	5 300		*a*
St Lawrence univ. mus. Canton	130	2 300	4 000	1 000		1 000		*a*	*a*	*a*
Syracuse univ. of nat. hist	130	700	1 000	1 700		1 000		5 000		*a*
Union col. nat. hist mus. Schenectady	131	1 500	4 500	3 000	375 species	2 860 species	600 species	2 400	700	
Univ. of Rochester	131	3 000	5 000	25 000		1 000		*a*	*a*	*a*
Vassar col. mus. Poughkeepsie	133	800	3 500	8 150		25 090		1 700		770
Ward's nat. sci. estab. Rochester	135	22 000	160 000	150 000		137 000		74		5 826
West Point min. and geol. cab.	136	4 500	5 913	9 074						*a*
North Carolina										
Davidson college museum	138		4 000	3 000		800				
North Carolina state mus. Raleigh	138	*df*	*df*	*df*		*df*		*df*	*df*	*df*
North Dakota										
North Dakota agric. col. mus. Fargo	139		400	*a*		350		*a*	*a*	50
Red River Valley univ. mus. Wahpeton	140	*a*	*a*	*a*		100		200		500
State univ. of N. D. mus. Grand Forks	140	800	2 000	1 000		299		440 species	1 200 species	650
Ohio										
Antioch col. Yellow Springs	141	*a*	500	10 000		4 000		600		*a*
Baldwin univ. mus. Berea	141	*a*	500	300		*a*		*a*		
Case sch. of applied science, Cleveland	142	1 854	2 957	7 000		8 900		2 724		
Cincinnati soc. of nat. hist	142	734	1 296	4 882		6 307		4 000		*a*
Cuvier club of Cincinnati	143						*a*			
Heidelberg univ. Tiffin	143	*a*	*a*	*a*		*a*		*a*	*a*	*a*
Hiram college mus	144	100	1 200	1 000		1 000		*a*	*a*	2 000

Oberlin college mus.	144	3 500 (trays)	2 950 (trays)	5 700 (trays)			20 000			35 000			3 500
Ohio state univ. mus. Columbus	145	2 500	500	11 000	40 000		10 000			83 000			100 000
Ohio Wesleyan univ. Delaware	147	1 000	2 000	5 000			25 000			300			1 200
Otterbein univ. Westerville	147	*a*	*a*	*a*			*a*			*a*	*a*		*a*
Scio college	147	800	3 000				150			1 000			*a*
Urbana univ. mus.	147	*a*	*a*	*a*			*a*			*a*	*a*		*a*
Western Reserve univ. Cleveland	148	1 200	2 500	6 000			10 000			1 000			
Oregon													
Oregon state agric. col. mus. Corvallis	148		1 000		75 000		*a*		*a*	10 000			
Univ. of Oregon, Condon mus. Eugene	149	900	800	6 000			1 000						325
Pennsylvania													
Acad. of nat. sci. of Philadelphia	149	*d*	6 000 (trays)	36 000	126 000		870 000		91 400	200 000			10 000
Albright college, Meyerstown	151	*a*	775	700			1 300			500			300
Alleghany college, Meadville	151	*a*	10 000	*a*			5 150			*f*	*f*		100
Bryn Mawr college	152	2 500	950	35 000									
Carnegie museum Pittsburg	152	*d*	7 000	*d*	72 000 species		16 070 species		4 100 species	120 000			6 750
Geneva col. mus. Beaverfalls	153	*a*	*a*	*a*	*a*		*a*		*a*	*a*	*a*		*a*
Haverford college mus	153	*a*	*a*		4 000		1 500			*a*	*a*		
Lafayette college mus. Easton	153		1 000	*a*			*a*			*d*	*d*		
Muhlenberg college, Allentown	153	400	500	600			500			3 000			
Pennsylvania college, Gettysburg	154	3 000	6 000							6 000			
Pennsylvania geol. sur. Harrisburg	154	10 000	135	4 220									
Pennsylvania state college, State College	155	5 200	10 000	2 000			15 000			5 500			
[1]The Philadelphia museums	156	*d*	*d*	*d*	*d*		*d*		*d*	*d*	*d*		*d*
Swarthmore col. mus	157	300	700	200	1 612		3 800		800	2 000			50
Univ. of Pennsylvania, Philadelphia	158	4 000	12 000	15 000	10 000				3 000	14 000			*d*
Wagner free inst. of science, Philadelphia	164		2 000	20 000			25 000			1 000			1 200
Washington & Jefferson col. Washington	164	1 000	2 500	*d*			2 000			500			800
Rhode Island													
Brown univ. Jenks mus. of zool. Provid'nce	165	500	5 000	10 000			25 000						1 000
Mus. of nat. hist. Providence	166	*a*	1 200	750	1 200		4 800						5 000
R. I. col. of ag. and mech. arts, Kingston	166	*a*	*a*	*a*	*a*		*a*		*a*	*a*	*a*		*a*

[1] 250,000 specimens. *a* Small collection. *d* Large collection. *df* Large local collection. *f* Local collection.

Synoptic list of museum collections (*continued*)

NAME	PAGE	PHYSICAL AND CHEMICAL GEOLOGY	MINERALS	FOSSILS	ZOOLOGY			BOTANY		ETHNOLOGY
					Insects	Other invertebrates	Vertebrates	Cryptogams	Phanerogams	
South Carolina										
Claflin univ. Orangeburg	167	300	3 000	250		1 500		1 000		
College of Charleston	167	300	2 000	5 000	5 000		2 000	5 000		1 000
Furman university, Greenville	168	500	1 500	300	100	500	*d*			100
South Carolina college, Columbia	168	*g*	*g*	*g*	*g*	*g*	*g*	*g*	*g*	*g*
South Dakota										
South Dakota geol. surv. Vermilion	168	*j*	*j*	*j*	*j*	*j*	*j*	*j*	*j*	*j*
State school of mines, Rapid City	168	1 200	3 000	900						
Univ. of South Dakota, Vermilion	169	850	700	1 125	200	2 000		2 000		
Yankton college, Yankton	170	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*
Tennessee										
Cumberland univ. mus. Lebanon	170	600		1 500		*a*	*a*	*a*		
Fisk university, Nashville	170					500		2 000		
Maryville col. mus.	170	200	1 000	750		300		478		410
So. western presbyterian univ. Clarksville.	171	*a*	6 000	*d*		16 000		500		
Univ. of Tennessee, Knoxville	172	*a*	*a*	*a*	*d*	*a*	*a*	30 000		*a*
Vanderbilt univ. Nashville	172	2 500	4 000	15 000		2 000		5 000		800
Walton univ. Nashville	172	50	400	100	18 000	1 000		300		150
Texas										
Univ. of Texas, Austin	173	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*
Univ. of Texas min. sur. Austin	175	*d*	*d*	*d*						
Utah										
Univ. of Utah, Salt Lake City	175	500	2 000	200		2 000		1 200		

Vermont																				
Fairbanks mus. of nat. sci. St Johnsbury	175	210		700		337		4 500				5 510				1 672				
Middlebury college	176	*a*		*a*		*a*	*a*		*a*		*a*		*a*			*a*				
University of Vermont, Burlington	177	2 000		5 000		5 000	6 000	14 000				20 000				10 000				
Vermont state cabinet, Montpelier	179	5 000		2 000		500		2 000				1 500				200				
Virginia																				
Emory & Henry college, Emory	180	*a*		*a*		*a*														
State mus. Va. mil. inst. Lexington	180	386		3 525		720		1 500												
Univ. of Virginia, Lewis Brooks mus. Charlottesburg	181	4 500		4 000		8 000		5 000				30 000				*a*				
Virginia Polytech. institute, Blackburg	182	*b* 800		900		*c* 800		800				3 000								
Washington																				
Ferry museum, Tacoma	183	50		250		150		50								200				
State agricultural college, Pullman	183	600		800		1 000	100 000	5 000				7 700	40 000			500				
Tacoma acad. of science, Tacoma	183			500												1 000				
Univ. of Washington mus. Seattle	183	7 000		4 000		3 500	*d*	*d*		*d*		6 500				*d*				
West Virginia																				
West Virginia univ. Morgantown	184	500		1 200		2 000	*d*	*a*		*a*		3 000				500				
Wisconsin																				
Beloit college, Logan mus. Beloit	185	800		600		1 500		1 000				1 500				2 500				
Lawrence univ. mus. Appleton	186	*a*		*a*		*a*		*a*				*a*		*a*		*a*				
Milton college mus	186			4 000				*df*				2 000				*a*				
Milwaukee pub. mus	187	6 340				14 204		153 012				17 379				21 710				
[1] Provincial seminary of St Francis	187	*a*		*a*		*a*		*a*				*a*		*a*		*a*				
Ripon college	188	*a*		2 000		1 000	500	4 000				300		4 000		200				
Univ. of Wisconsin, Madison	188	32 000		34 000		*d*		*d*				7 000		17 000						
Wisconsin acad. of sciences, arts & letters, Madison	190	*k*		*k*		*k*		*k*				*k*		*k*		*k*				
Wyoming																				
Univ. of Wyoming mus. Laramie	190	600		300		3 000		200				30 000				420				

[1] 1,500 specimens. *a* Small collection. *b* Including fossils. *c* Including geology. *d* Large collection. *df* Large local collection. *g* Collection destroyed by fire. *j* Collection in state univ. museum. *k* Collection in Univ. of Wisconsin museum.

Synoptic list of museum collections (*concluded*)

NAME	PAGE	PHYSICAL AND CHEMICAL GEOLOGY	MINERALS	FOSSILS	ZOOLOGY			BOTANY		ETHNOLOGY
					Insects	Other invertebrates	Vertebrates	Cryptogams	Phanerogams	
CANADA										
British Columbia										
Provincial museum, Victoria	191	207	1 915	3 076		11 659		564		1 663
Manitoba										
Hist. & sci. soc. of Manitoba, Winnipeg	191		*f*	*f*						
New Brunswick										
Nat. hist. soc. of St John	191	*a*	*a*	*a*						
Univ. of New Brunswick, Fredericton	191	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*
Newfoundland										
Mus. of the geol. sur. of N. F. St John's	223	*a*	500	1 173	*a*	750	809	493		*d*
Nova Scotia										
Acadia college mus. Wolfville	193	*d*	*a*	600	*d*	*d*	*d*	*d*		
Kings college, Windsor	193	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*	*a*
Provincial mus Halifax	194	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*
Ontario										
Geol. sur. of Canada, Ottawa	195	7 000		16 000	*l*	*l*	*l*	*l*	*l*	*l*
Hamilton scientific ass'n, Kingston	195			*f*						
Kingston school of mining, Kingston	195	5 000	10 000	*d*						
Ont. agric. college, Guelph	196	*a*	*a*	*a*						
Perth collegiate inst. mus	196	800	400	*a*				300		
Provincial ethnological mus. Toronto	196					400		500		2 200
Queens col. & univ. mus. Kingston	197	*d*	3 600	5 000	2 950		196	24 181		500

Univ. of Toronto	197	5 645	7 125	20 000	*d*	*d*	*d*	*d*	*d*	*d*	
Victoria univ. mus. Toronto	199	500	1 000	3 000	.....	.....	.....	.....	.....		*d*
Quebec											
Laval univ. Quebec	199	*a*	4 000	*a*	*d*	*d*	*d*	10 000			
McGill univ. Peter Redpath mus. Montreal	200	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*	*d*	
Montreal col. philosophy house	200	.....	*a*								
Nat. hist. soc. of Montreal	200	*a*	*a*	*a*							

a Small collection. *d* Large collection. *f* Local collection. *l* Complete Canadian collection.

PUBLIC BOTANIC AND ZOOLOGIC GARDENS AND AQUARIUMS IN THE UNITED STATES

The desirability of this list has become evident during the compilation of the directory of museums as the collections maintained are in many instances supplementary to the museums and contain so much material of great value to investigators in botany and zoology.

From the information at present on hand only a very incomplete notice can be given. The tendency in most of the large cities seems to be to maintain collections of living animals and botanic departments in the public parks where the work has not already been undertaken by scientific societies.

DISTRICT OF COLUMBIA

National zoological park, Washington. Director, ex officio; S. P. Langley, *secretary of the Smithsonian Institution;* Frank Baker, *superintendent;* A. B. Baker, *property clerk;* W. H. Blackburne, *head keeper.*

The number of animals in the collection, June 30, 1902, 883; estimated value of animals, $38,000.

Approximate number of specimens: mammals, 123 species, 506 specimens; birds, 72 species, 232 specimens; reptiles, 32 species, 145 specimens. The aquarium is fitted with 17 tanks and usually contains from 40 to 70 species of fish and invertebrates, represented by from 150 to 400 specimens. A small working library is maintained at the superintendent's office. Animals which die in the collections are sent to the United States national museum.

MINNESOTA

Board of park commissioners, Minneapolis. J. A. Ridgway, *secretary.*

A limited zoologic garden under the direction of the superintendent of public parks is maintained and contains 25 species, 166 specimens of mammals and 130 birds.

NEW YORK

Buffalo zoological garden, Buffalo. F. A. Crandall jr, *curator.*

The collections consist of the following animals: mammals, 35 species, 159 specimens; birds, 24 species, 67 specimens; reptiles, 6 species, 44 specimens.

Rochester zoological park, Rochester. William Bausch, *chairman of zoological committee;* C. C. Lang, *superintendent of parks.*

The collections consist of: mammals, 38 species, 141 specimens; birds, 80 species, 371 specimens; reptiles 3 species, 3 specimens.

The New York zoological society. THE AQUARIUM, Battery park. Charles H. Townsend, *director.*

The collections consist of marine and fresh-water life and include only such forms as can be shown to advantage in tanks. While fishes constitute the main feature of the exhibit, batrachians, reptiles and seals represent the higher forms of life. Ascidians, crustaceans, worms, mollusks, echinoderms, anemones and corals, are among the lower forms shown.

The New York aquarium has the largest buildings and the most extensive collections of marine and fresh-water life in the world.

NEW YORK ZOOLOGICAL PARK, Bronx. William T. Hornaday, *director.*

Collections of living animals: mammals, 141 species, 612 specimens; birds, 175 species, 1005 specimens; reptiles, 131 species, 1198 specimens.

These numbers are subject to constant change. New animal houses are now being constructed and collections will be extended as facilities for their accommodation increase.

New York botanical garden museum, Bronx park. N. L. Britton, *director;* D. T. MacDougal, *first assistant;* John K. Small, *curator of the museums;* P. A. Rydberg, Arthur Hollick, Marshall A. Howe, F. S. Earle, *assistant curators;* George V. Nash, *head gardener;* Anna Murray Vail, *librarian;* H. H. Rusby, *curator of the economic collections;* William J. Gies, *consulting chemist;* F. A. Schilling, *superintendent;* John R. Brinley, *landscape engineer;*

Walter S. Groesbeck, *clerk and accountant;* Cornelius Van Brunt, *honorary floral photographer.*

Paleobotany. The collection of 8000 specimens is mainly the property of Columbia university. It was begun by the late Prof. J. S. Newberry and in addition to the exhibition series, contains specimens from almost every section of the world and from every geologic horizon. It is specially rich in North American forms. The Triassic Cretaceous and Tertiary plants are represented by specimens collected by the Hayden exploring expedition, Missouri and Yellowstone rivers 1859–60; the McComb and Ives explorations of the Grand, Green and Colorado rivers 1859–61, and by an extensive suite of specimens from the clay beds of New Jersey, on which Dr Newberry based his *Flora of the Amboy clays.* An exceedingly interesting local series is shown which was collected by Dr Arthur Hollick on Long Island, Block Island and Marthas Vineyard. The fossil plants are arranged primarily on the sequence of the geologic time divisions and are designed to show the succession of plant life on the earth.

Economic botany. On the first floor of the building are 24 cases of drugs in two series, crude drugs and refined drugs. The crude drugs are arranged morphologically, as from roots, stems, bark, flowers etc. to the whole plant. Refined drugs are first divided into products, and these arranged in their natural families. In this section is shown a collection of local poisonous plants; 20 cases of woods and wood products; 12 cases of fibers, 9 cases containing crude fibers and their products, 2 cases of wood paper and straw paper; one case of cork; 12 cases of foods and food plants divided into three groups; 1 case of dry seeds and fruits, 2 cases of fleshy seeds and fruits, 3 cases of herbs or parts of herbs or woody plants other than seeds or fruit.

A collection of miscellaneous exhibits fills 20 cases as follows: 1 of turpentine and rosin; 3 of gums and resins; 2 of fodder plants; 1 of crude and refined sugars; 1 of tobacco; 2 of volatile oils, 1 of fixed oils; 1 of starches; 1 of chocolate; 1 of barley malt, beer and ale; 1 of grape juice and wines; 1 of cinnamon; 1

of spices; 1 of licorice; 1 of soap-making, insect powders and miscellaneous vegetable products.

The specimens throughout the economic museum are supplemented by plates, photographs and drawings.

Systematic botany. A general synoptic collection consisting of 72 cases occupies the second floor of the building. Typical specimens of plants occupy the backs of the cases while on the shelves are arranged photographs, drawings, flowers, fruits, woods, fossils, etc. The present installation is as follows: one case (the first) contains the myxomycetes or slime molds. The seven cases following this are devoted to the algae or seaweeds. The succeeding seven cases contain the various groups of the fungi. Three cases are devoted to the lichens, two to the hepatics, four to the mosses, three to the pteridophytes, three to the gymnosperms, six to the monocotyledons and 36 to the dicotyledons.

There is also a collection mounted on swinging frames of every species of plant known to grow naturally within 100 miles of New York. A unique exhibit, both suggested and presented by William E. Dodge, consists of 24 microscopes of special design showing a series of slides of cryptogamic plants.

The library and herbarium occupy the third floor. There are 13,000 volumes now in the library, about one half of which constitute the botanic library of Columbia university.

The herbarium contains 1,100,000 specimens, 700,000 in the Columbia herbarium and 400,000 in the garden herbarium. The latter collection is rapidly gaining in value and importance.

1 Garden herbarium. The specimens composing it have been derived from collections made in all parts of the world during the past few years (specially since the foundation of the garden) in addition to miscellaneous specimens and many rare sets of plants of earlier collections fortunately acquired through the accessions of the following collections:

The J. B. Ellis herbarium, of fungi.

The John J. Crooke herbarium, mainly North American.

The F. M. Hexamer herbarium, European and North American.

The H. E. Hasse herbarium, North America, largely Californian.

The Per A. Rydberg herbarium, North American and European.

The Lewis R. Gibbes herbarium, North American, mainly from South Carolina.

The Peter V. LeRoy herbarium, miscellaneous.

The Harry Edwards herbarium, North American, mainly Californian.

The Anna M. Vail herbarium, eastern North America.

The Francis E. Lloyd herbarium, North American, largely from Oregon.

The A. Vigener herbarium, mainly European and Mexican.

The E. C. Howe herbarium, North American, largely fungi.

The American museum of natural history herbarium, miscellaneous.

The Torrey botanical club herbarium, vicinity of New York city.

The T. F. Allen herbarium of Characeae.

The George V. Nash herbarium, miscellaneous, mostly American.

The A. Henry herbarium of Chinese plants.

The Elizabeth G. Britton, herbarium, eastern North America.

The Gustav Rampsperger herbarium, miscellaneous.

2 Columbia herbarium. The Columbia university herbarium was begun early in the last century by Dr John Torrey, and contains the material upon which his botanical writings, extending over half a century, were based. On this foundation the present Columbia herbarium was built. Mr John J. Crooke enriched it by two valuable collections: one, that of Prof. C. J. Meisner, of Basle, Switzerland, and the other that of the late Dr A. W. Chapman, of Apalachicola Fla. A few years later the mosses, and many of the hepatics and lichens accumulated by C. F. Austin, were incorporated in it, while the most recent acquisitions of great size and importance, are the most famous collection of mosses brought together from all parts of the

world by the late Dr J. G. Jaeger, of Switzerland, and the Morong herbarium. To this ample nucleus, Dr Torrey's successor, Dr N. L. Britton, while professor at Columbia, and his associates, added continually by securing collections from all parts of the globe, and by special collecting trips to various parts of America.

The conservatories consist of a range of 15 houses with about one acre of floor space. The construction throughout is in accordance with the most modern principles and the structures form the most elegant glasshouses in the world. Over 20,000 plants, representing 6000 species are now growing in the houses. The collections are arranged botanically as far as temperature conditions will permit. There is also a system of propagating and experimental greenhouses.

The outside collections are in the Herbaceous ground, the Fruticetum and the Arboretum. About 2700 species of herbaceous plants and over 300 trees represent almost all orders of plants containing hardy species.

The wild flora has been carefully conserved and includes over 600 flowering plants and about 2000 cryptogams.

The museum is a new specially designed building of Italian renaissance style, of Indiana limestone and terra cotta. It is specially equipped with all modern appliances for the comfort of those using it and is open to the public daily from 9 a. m. to 5 p. m. The library and herbarium are open to students. There are no regular courses of instruction but properly prepared students are given such guidance and assistance as they may need to prosecute investigations. Two courses of public lectures are provided during the year.

OHIO

Cincinnati zoological garden, Cincinnati. S. A. Stephen, *general manager;* W. Kesley Schaepf, *president;* Walter A. Draper, *secretary.*

The garden is situated 3 miles from the center of the city in an easily accessible locality. The natural landscape features

have been taken advantage of in adapting the garden to its present use. The garden is open the year around to visitors, a small admission fee is charged. The animals are housed in a number of specially designed buildings. There is also a clubhouse and restaurant. The collections include the following specimens: mammals, 643; birds, 691; reptiles, 176; total, 1510.

The lake and small ponds are well stocked with fish. A small library of reference books is maintained.

PENNSYLVANIA

The Highland park zoological garden, Pittsburg. William W. Bailey, *superintendent.*

About 200 specimens of monkeys, Herbivora, Carnivora, birds and reptiles.

The Zoological society of Philadelphia, Philadelphia zoological garden. Charles Platt, *president of the board of directors;* Henry C. Chapman, *corresponding secretary;* A. E. Brown, *superintendent.*

The collections consist of animals of the higher orders of vertebrates. 1465 species have been exhibited belonging to the following orders: mammals, 407; birds, 711; reptiles 304; batrachians, 43.

The society maintains a library for reference.

RHODE ISLAND

Roger Williams park zoological garden, Providence. A small collection of animals is maintained by the city park commission, the collection at present consists of: mammals, 20 species, 90 specimens; birds, 14 species, 225 specimens; reptiles, 1 species, 4 specimens. There is also a small reference library and museum.

Among those which are not otherwise noted are the following:

Missouri botanical garden, St Louis Mo. William Trelease, *director.*

National botanical garden, Washington D. C. William R. Smith, *director.*

Harvard botanical garden, Cambridge Mass. (Collections partly enumerated under Harvard university). George L. Goodale, *director.*

Buffalo botanical garden, John R. Cowell, *director.*

The Arnold arboretum, Boston Mass. C. S. Sargent, *director.*

The city of Detroit is now building an aquarium and maintains a zoologic garden.

There is also a collection of animals in Lincoln park, Chicago.

ADDENDA

Received too late to be inserted in their proper place in the text.

CALIFORNIA

California academy of sciences, San Francisco. Leverett Mills Loomis, *director of the museum and curator of ornithology;* H. H. Behr, *curator of entomology;* Alice Eastwood, *curator of botany;* John Van Denburgh, *honorary curator of herpetology;* Alfred L. Kroeber, *honorary curator of anthropology;* F. M. Anderson, *honorary curator of paleontology;* Charles Fuebis, *preparator of entomology.*

Paleontology. Small collection chiefly of invertebrate fossils. It contains a number of type specimens and is constantly growing.

Mineralogy. Several thousand including many rare specimens.

Economic geology. Collection small.

Zoology. An extensive collection representing all orders. Birds about 20,000 including several types; 4500 reptiles and batrachians with a few type specimens; 4000 fishes, 36 types; 45,000 insects with over 1000 types.

Much material for exchange.

Botany. 110,000 specimens. Every department of botany is well represented. The collection is of general distribution but particularly rich in Pacific coast N. A. plants, and contains the types of many species.

Specimens for exchange.

Ethnology. 2200 specimens from Alaska, California, South Sea islands and Japan, specially strong in Polynesia. The academy has a library of 11,000 volumes on natural history and publishes a series of proceedings (octavo) memoirs (quarto) and occasional papers (octavo).

MICHIGAN

Detroit Museum of Art, Detroit. A. H. Griffith, *director.*

Paleontology. 5000 specimens.

Mineralogy. 3000 specimens.

Economic geology and lithology. 300 specimens.

Zoology. 8000 insects, 60.000 mollusks and 700 specimens of other orders.

Botany. A collection of 3000 specimens.

Ethnology. 3500 specimens.

PENNSYLVANIA

Lehigh university, South Bethlehem.

Paleontology. 3000 specimens illustrating common genera. Paleozoic Mollusca and Brachiopoda best represented.

Mineralogy. 10,000 specimens included in the Roepper collection, a general collection of 3000 specimens; the Keim collection of 1000 specimens and about 300 other specimens and a practice collection of 2500 specimens.

Economic geology and lithology. 4000 specimens: illustrative collections from the Rocky mountains; ores of precious metals, copper and iron ores and coal; specimens of rocks from all parts of the world but chiefly from Europe and the United States. 400 specimens for exchange.

Zoology. 2500 specimens. The Werner collection of North and South American birds, nests and eggs, 600 specimens; the Packer collection of recent shells, mostly gastropods, 1000 specimens, and a synoptic collection of 2500 specimens.

Botany. A small collection, mainly microscopic sections.

Ethnology. 1000 specimens North American Indian weapons, clothing and utensils.

CANADA

Museum of the geological survey of Newfoundland, St John's. James P. Howley, *director.*

Paleontology. 1173 specimens divided as follows: Archaean, 3 specimens of Eozoon canadense; Avalonian, Arenicolites and Aspidella from Newfoundland, Oldhamia radiata from Ireland. Cambrian; about 500; lower series well represented, many typical fossils from Newfoundland. Lower Silurian 200, Middle Silurian 150, Upper Silurian 40, some Devonian forms; Carboniferous 200. The above all from Canada and Newfoundland except as noted. Jurassic 25, England; Cretaceous 26, England and United States; Tertiary 32, Canada and United States.

Mineralogy. 500 specimens, chiefly from Newfoundland localities the remainder from various countries.

Economic geology. Specimens of granites, sandstones, marbles, serpentine, slates, clays, etc.

Lithology. A collection of rock specimens.

Zoology. 1659 specimens: 30 native and 12 Australian mammals. 150 native and 165 foreign birds; 50 native and 502 foreign fishes; 250 native and 500 foreign shells, a few native and many foreign insects.

Botany. 365 herbarium specimens; 28 native woods.

Ethnology and anthropology. Bones and other remains of the Boeothucs, the Indians of Newfoundland. Stone and iron implements, ornaments, drawings, etc. A few Eskimo and Micmac implements, ornaments and utensils.

A good set of fishery products including oils, fertilizers, preserved fish, etc. Models of fishing vessels and implements; photographs illustrating the fisheries industry; numerous photographs of mining, lumbering and natural scenery. A number of local historical relics and many others from foreign sources.

A few specimens in all departments except ethnology for exchange.

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New York State Museum

FREDERICK J. H. MERRILL Director

Bulletin 66

MISCELLANEOUS 2

INDEX TO PUBLICATIONS

OF THE

NEW YORK STATE NATURAL HISTORY SURVEY

AND

NEW YORK STATE MUSEUM

1837-1902

ALSO INCLUDING OTHER NEW YORK PUBLICATIONS ON RELATED SUBJECTS

BY

MARY ELLIS

Indexer University of the State of New York

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1903

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Bulletin 66

MISCELLANEOUS 2

INDEX TO PUBLICATIONS

OF THE

NEW YORK STATE NATURAL HISTORY SURVEY

AND

NEW YORK STATE MUSEUM

1837-1902

PREFACE

The New York State Museum was established at the time of the final arrangement of the collections of the Natural History Survey of New York in 1843. An act of the Legislature placing the collections in the custody of the Regents of the University was passed May 10, 1845, and the first official report was published in 1848. In 1870 a law was passed establishing the museum on a permanent basis. Till 1871 the museum was styled the State Cabinet of Natural History and appears thus on the titlepages of the early reports. For a description of the Natural History Survey of New York and the origin of the State Museum, *see* Museum bulletin 19, p. 240-45, Museum bulletin 56, p. 5-10, University handbook 5, *also* Subject index under Natural History Survey, p. 442.

The publications indexed are those of the New York State Museum from 1848-1902 inclusive; also the annual reports of the early Natural History Survey, 1837-41; the final quarto reports constituting the *Natural History of New York* published 1842-94; papers on geology and entomology in the transactions of the

New York State Agricultural Society, of the Albany Institute and in Regents reports; and entomological papers in reports of the Forest, Fish and Game Commission. Publications which will bear an imprint date later than 1902 are referred to as *In press*, or *In preparation*, and are not fully indexed.

The later museum reports have two sets of paging, the first being distinguished by the letter r prefixed to page numbers of the director's report. Dates covered by a report are in curves, followed by dates of publication. Volume and page numbers are separated by a colon; e. g. 3:141 means volume 3, page 141.

For explanatory matter referring particularly to the subject index, *see* p. 304.

In the preparation of this bulletin, the indexer has received invaluable assistance from the State Museum staff, to whom cordial acknowledgments are made.

MARY ELLIS

ABBREVIATIONS

New York State Museum. Publications. 1848-1902.
- Reports ..... Mus. rep.
- Bulletins ..... Mus. bul.
- Memoirs ..... Mus. mem.
- Geologist's reports ..... Geol. rep.
- Paleontologist's reports ..... Pal. rep.
- Entomologist's reports ..... Ent. rep.
- Botanist's reports ..... Bot. rep.

Natural History Survey. Annual reports. 1837-41.
- Mineralogy ..... Min. rep.
- Geology ..... Geol. rep. 1st dist.
  " 2d "
  " 3d "
  " 4th "
- Paleontology ..... Pal. rep.

Natural History of New York. Final reports. 1842-94.
- Zoology ..... Zool. N. Y.
- Botany ..... Bot. N. Y.
- Mineralogy ..... Min. N. Y.
- Geology ..... Geol. N. Y.
- Agriculture ..... Ag. N. Y.
- Paleontology ..... Pal. N. Y.

Illustrations of Devonian Fossils ..... Ill. Dev. Foss.
New York State Agricultural Society. Transactions .. Ag. Soc. Trans.
Albany Institute. Transactions ..... Alb. Inst. Trans.

Any of the University publications will be sold in lots of 10 or more at 20% discount. When sale copies are exhausted, the price for the few reserve copies is advanced to that charged by secondhand booksellers to limit their distribution to cases of special need. Such prices are inclosed in brackets.

All publications are in paper covers, unless binding is specified.

Museum annual reports for 1847-1900. 1848-1902.

Price for all in print to 1892, 50 cents a volume, 75 cents in cloth; 1892-date, 75 cents, cloth.

These reports are made up of the reports of the director, geologist, paleontologist, botanist and entomologist, and museum bulletins and memoirs, issued as advance sections of the reports.

1 (for 1847) 1848. 33+39+15 p. O.

Contents: Report of Chancellor, p. 3-4; Account, p. 5; Donations 1847, p.6; Catalogue of Mammalia and Birds Ap. 11, 1818, p.7-20; Beck, L. C. Catalogue of Specimens in the Mineralogical Department of the Geological Survey, p.21-33; Hall, James. Catalogue of Specimens in the Geological Department of the Geological Survey. 39p.; Hall, James. Catalogue of Specimens in the Palaeontological Department of the Geological Survey, 15p.

2 (for 1848) 1849. 91 p. 5 pl. (lith.) O.

Contents: Report of Chancellor, p. 9-12; Account, p. 13-14; Catalogue of Quadrupeds, Birds, Reptiles, Fishes etc. added Ap. 11, 1848 to Jan. 1, 1849, p.15-23; Fitch, Asa. Catalogue of Insects Dec. 1, 1848, p.25-39; Torrey, John. Catalogue of Plants of the State of New York, of which Specimens are preserved in the Cabinet at Albany, p.41-64; List of Minerals, Geological Specimens and Fossils added 1847 and 1848, p.65-70; Catalogue of the historical and antiquarian collection, p.71-79; Morgan, L. H. Communications from, p. 81-91; Ground Plans and Dimensions of Several Trench Inclosures in Western New York or Fort Hills, 5 pl.

3 (for 1849) 1850. 175 p. illus. 28 pl. (lith.) O.

Contents: Report of Chancellor, p. 9-12; Account, p. 14-16; Catalogue of Quadrupeds, Birds, Reptiles, Amphibians, Fishes etc. added Jan. 1, 1849 to Jan. 1, 1850, p.17-26; List of Minerals, Geological Specimens and Fossils added Jan. 1, 1849 to Jan. 1, 1850, p.27-46; Additions to the Historical and Antiquarian Collection, Jan. 1, 1849 to Jan. 1, 1850, p.47-60; Catalogue of Reptiles and Amphibians Jan. 1, 1850, p.61-64; Morgan, L. H. Report upon Articles Furnished the Indian Collection, p.65-97, 18 pl.: Hough, F. B. Ancient Remains of Art in Jefferson and St

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*a*A preliminary edition of 97 p. was also issued.

Lawrence Counties, p.99-105, 5 pl.; Beck, L. C. Mineralogy of New York, p.107-51; References to Essays and Writings on the Natural History of New York, p.153-56; Index to Volumes in the State Cabinet containing the Plants of New York, p.157-66; Hall, James. New Species of Fossils from the Trenton Limestones, p.167-75. 5 pl.

3 *rev. ed.* (for 1849) 1850. 183p. 28 pl. (lith.) O.

Contents: Report of Chancellor, p.9-12; Catalogue of Quadrupeds, Birds, Reptiles, Amphibians, Fishes etc. added Jan. 1, 1849 to Jan. 1, 1850, p.15-24; Catalogue of Reptiles and Amphibians Jan. 1, 1850, p.25-28; List of Minerals, Geological Specimens and Fossils added Jan. 1, 1849 to Jan. 1, 1850, p.29-48; Additions to the Historical and Antiquarian Collection Jan. 1, 1849 to Jan. 1, 1850, p.49-62; Morgan, L. H. Report upon Articles Furnished to the Indian Collection, p.63-95. 1Spl.; Hough, F. B. Ancient Remains of Art in Jefferson and St Lawrence Counties, p. 99-105. 5 pl.; Beck, L. C. Mineralogy of New York, p. 109-53; References to Essays and Writings on the Natural History of New York, p.155-60; Index to Volumes in the State Cabinet containing the Plants of New York, p.161-72; Hall, James. New Species of Fossils from the Trenton Limestones, p. 173-83. 5 pl.

4 (for 1850) 1851. 146 p. illus. 5 pl. (lith.) O.

Contents: Report of Chancellor, p. 9-12; Account, p. 14-16; Catalogue of Quadrupeds, Birds, Reptiles, Amphibians etc. added Jan. 1, 1850 to Jan. 1, 1851, p.17-41; Fitch, Asa. Catalogue of Insects collected and arranged, p.43-69; Botany, p.71; List of Minerals, Geological Specimens and Fossils added Jan. 1, 1850 to Jan. 1, 1851, p.73-90; Additions to the Historical and Antiquarian Collection Jan. 1, 1850 to Jan. 1, 1851, p.91-101; Hough, F. B. Notices of Ancient Remains of Art in Jefferson and St Lawrence Counties, p.103-9. 5 pl.; Salisbury, J. H. Analysis of a Specimen of Hematitic Iron Ore, p.111; References to various Writings relating to the Natural History of New York that have appeared during the Year, p.113-16; Hall, James. Catalogue of Specimens of the Rocks and Fossils in the Gray Sandstone, Medina Sandstone, Clinton Group, Niagara Group, Onondaga Salt Group, and a Part of the Water-lime Group, p.117-42; Memorandum of Drawers and Boxes of Fossils, p.143-46.

5 (for 1851) 1852. 117p. illus. 22pl. (lith.) O.

Contents: Report of Chancellor, p. 9-10; Account, p. 12-14; Catalogue of Quadrupeds, Birds, Reptiles, Amphibians, Fishes etc. added Jan. 1, 1851 to Jan. 1, 1852, p.15-34. 2 pl.; Catalogue of Minerals, Geological Specimens and Fossils added Jan. 1, 1851 to Jan. 1, 1852, p.35-43; Additions to the Historical and Antiquarian Collection Jan. 1, 1851 to Jan. 1, 1852, p.45-54; References to various Writings relating to the Natural History of New York that have appeared during 1851, p.55-57; Meriam, E. Description of the Means employed to Remove the Rocks at Hellgate by Submarine Engineering, p.59-64; Materials belonging to the State, which have been used in Publishing the Natural History and the Annual Reports of the Regents received since Feb. 12, 1851, p.65-66; Morgan, L. H. Report on the Fabrics, Inventions, Implements and Utensils of the Iroquois, made Jan. 22, 1851, p.67-117. 20 pl.

6 (for 1852) 1853. 35 p. O.

Contents: Report of Chancellor, p. 7-8; Gebhard, John, jr. Statement and Proposal of, p.9-11; Catalogue of the Cabinet of Fossils of John Gebhard jr, p.12-13; Account, p.14-15; Catalogue of Quadrupeds, Birds, Reptiles, Amphibians etc. added Jan. 1, 1852 to Jan. 1, 1853, p.17-24; Catalogue of Minerals, Geological Specimens and Fossils added Jan. 1, 1852 to Jan. 1, 1853, p.25-28; Fossils which were Part of Gebhard Collection delivered by Hall to the Curator of the State Cabinet, p.29-30; Miscellaneous, p.31-32; Additions to the Historical and Antiquarian Collection Jan. 1, 1852 to Jan. 1, 1853, p.33-35.

7 (for 1853) 1854. 128p. illus. 2pl. (lith.) O.

Contents: Report of Chancellor, p.7-9; Account, p.10-11; Catalogue of Quadrupeds, Birds, Reptiles, Amphibians, Fishes etc. added Jan. 1, 1853 to Jan. 1, 1854, p.13-26; Catalogue of Mollusca, Crustacea, etc. added Jan. 1, 1853 to Jan. 1, 1854, p.27-42; Additions to the Botanical Department Jan. 1, 1853 to Jan. 1, 1854, p.43-50; List of Minerals, Geological Specimens and Fossils added Jan. 1, 1853 to Jan. 1, 1854, p.51-65; Additions to the Historical and Antiquarian Collection Jan. 1, 1853 to Jan. 1, 1854, p.67-72; Catalogue of Indian Relics, p.73-77; Cook, G. H. On the Nature of Specimens of Salt and Salt Water presented by him with an Analysis, p.79-93; Baird, S. F. On the Serpents of New York, p.95-124, 2pl.; Order of Publication of the Volumes of Natural History of New York, p.125; Materials to be used in Completing the Publication of the Natural History, p.127.

8 (for 1854) 1855. 69p. 1pl. (lith.) O.

Contents: Report of Chancellor, p. 7-8; Account, p. 9-10; Catalogue of Quadrupeds, Birds, Reptiles, Fishes etc. added Jan. 1, 1854 to Jan. 1, 1855, p.13-22; List of Minerals, Geological Specimens and Fossils added Jan. 1, 1854 to Jan. 1, 1855, p.23-31; Additions to the Historical and Antiquarian Collection Jan. 1, 1854 to Jan. 1, 1855, p.33-39; Materials to be used in Completing the Publication of the Natural History, p.41-44; Miscellaneous, p. 45-48; DeKay, J. E. Catalogue of the Fishes Inhabiting the State of New York, p. 49-69.

9 (for 1855) 1856. 64 p. illus. O.

Contents: Report of Chancellor, p.7-8; Account, p.9; Catalogue of Birds, Reptiles, Amphibians, Fishes and Shells added Jan. 1, 1855 to Jan. 1, 1856, p.11-38; List of Minerals, Geological Specimens and Fossils added Jan. 1, 1855 to Jan. 1, 1856, p.39-48; Additions to the Historical and Antiquarian Collection Jan. 1, 1855 to Jan. 1, 1856, p.49-60; Materials to be used in Completing the Publication of the Paleontology, p.61-63.

10 (for 1856) 1857. 190p. illus. O.

Contents: Report of Chancellor, p.7-8; Account, p.9; Addresses delivered at the Inauguration of the State Geological Hall, p.11-28; Catalogue of Fossils collected by Jewett, p.29-37; Hall, James. Descriptions of Palaeozoic Fossils, p.39-180; Hall, James. On the Genus Tellinomya and Allied Genera, p. 181-86; Miscellaneous, p. 187-90.

11 (for 1857) 1858. 44 p. O.

Contents: Report of Chancellor, p. 7-9; Account, p. 10; Catalogue of Geological Specimens from England, p.11-36; Catalogue of Shells, p.37-42; Catalogue of Fossils, p.43; Miscellaneous Contributions, p.44.

12 (for 1858) 1859. 111 p. illus. O.

Contents: Report of Chancellor, p.3-4; Account, p.5; Hall, James. Contributions to the Palaeontology of New York, p.7-96, 110; Donations and Purchases during 1858, p.97-109; Note on the genus Ambonychia, p.110.

13 (for 1859) 1860. 128 p. illus. 24 pl. (lith.) map. O.

Contents: Report of Chancellor, p. 5-6; Account, p. 7-8; Catalogue of Mammalia, Birds, Reptiles and Fishes added Jan. 1, 1859 to Jan. 1, 1860, p.11-14; List of Deficiencies in Mammalia, Birds, Reptiles and Amphibia Inhabiting the State, p.15-16; Additions to the Cabinet, principally Fossils, p.17-18; List of Geological and Mineralogical Specimens donated by T. A. Cheney, p.19; Donations to the Historical and Antiquarian Collection from T. A. Cheney, p.20; Catalogue of the Reigen Collection of Mazatlan Mollusca presented by P. P. Carpenter, p.21-36; Cheney, T. A. Ancient Monuments in Western New York, p.37-52, 24 pl.; Hall, James. Contributions to Palaeontology, 1858 and 1859, p.53-125; Supplementary Note on Palaeontology of New York v.3, p.126-28.

14 (for 1860) 1861. 109p. 20pl. (lith.) O.

Contents: Report of Chancellor, p. 7-8; Account, p. 9-10; Catalogue of Additions Jan. 1, 1860 to Jan. 1, 1861, p.13-15; Lincklaen, Ledyard. Guide to the Geology of New York and to the State Geological Cabinet, p.17-85, 20 pl.; Hall, James. Contributions to the Palaeontology of New York, p. 87-110.

15 (for 1861) 1862. 198p. illus. 11pl. (lith.) O.

Contents: Report of Chancellor, p. 7; Account, p. 9; Donations Jan. 1, 1861 to Jan. 1, 1862, p. 13; Catalogue of Shells from John G. Anthony, p.15-21; Catalogue of Shells contributed from the Duplicates collected by the Exploring Expedition by Prof. Henry, p.23-25; Hall, James. Contributions to Palaeontology, p.27-197. 11 pl.; Jewett, Ezekiel. Letter regarding Fossils of the Chemung group, p.198.

16 (for 1862) 1863. 226p. illus. 16pl. (lith.) O.

Contents: Report of Chancellor, p.7; Account, p.9; Donations 1862, p.13-14; Catalogue of Collections made by the Curator 1862, p.15; Danker, H. A. List of Birds of New York noticed in Maine June 1862, p.15-16; Hall, James. Contributions to Palaeontology, p.17-226. 16 pl.; Bruyas, Jacques. Radical Words of the Mohawk Language, 123 p.

17 (for 1863) 1864. 60 p. O.

Contents: Report of Chancellor, p. 5-6; Report of Secretary of Regents, p.9-11; List of Deficiencies, p.12-19; Donations 1863, p.20-21; Catalogue of Additions made by the Curator 1863, p.22-23; Additions 1863 acquired by Purchase, p.23; Clinton, G. W. Plants of Buffalo and its Vicinity, p. 24-35; Meteorological Observations, p. 36-45; Annual Meteorological Synopsis for 1863, p. 46-49; Hall, James. Contributions to the Palaeontology of New York, p.50-60.

18 (for 1864) 1865. 231p. illus. 2pl. (phot.) O.

Contents: Report of Chancellor, p. 5-7; Additions 1864, p. 11-16; Ward, H. A. Wadsworth Gallery of Casts of Fossil Animals, p. 17-52. 2 pl.; Paine, J. A. Catalogue of Plants found in Oneida County and Vicinity, p. 53-192; Peck, C. H. Catalogue of Mosses, p. 193-96; Clinton, G. W. Flora of the State, p. 197-205; Results of Meteorological Observations, p. 207-31.

19 (for 1865) 1866. 80 p. O.

Contents: Report of Chancellor, p. 5-7; Special Report of the Regents in Relation to the State Cabinet of Natural History, p. 8-32; Account, p. 33; Additions 1865, p. 39-41; Peck, C. H. List of Mosses, p. 42-70; List of Plants for State Herbarium collected by H. B. Lord, p.71; Clinton, G. W. Flora of the State, p. 72-80.

20 (for 1866) 1867. 410p. illus. 21pl. (lith.) O.

Contents: Report of Chancellor, p. 5-8; Account, p. 11; Additions 1866, p.15-18; Catalogue of Shells presented by Smithsonian Institution, p.19-54; List of Specimens in the Economic Collection, p.55-57; Catalogue of Books in the Library, p.59-61; Wilson, W. D. Local Climatology, p.63-106; Meteorological Observations, p.107-40; Whitfield, R. P. Observations on the Internal Appendages of the Genus Atrypa, p. 141-44. 1 pl.; Notice of v.4 of the Palaeontology of New York, p.145-68; Hall, James. Introduction to the Study of the Graptolitidae, p.169-239; Hall, James. Contributions to Palaeontology, p.240-401. 16 pl.; [a]Hall, James. Notes upon the Geology of some Parts of Minnesota; Note upon the Structure of the Mountain Region in the Northern Part of Georgia and Alabama, and the Adjacent Parts of Tennessee; Note upon the Geological Relations of the Oil-bearing Strata of Canada West; Peck, C. H. Flora of the State, p.403-10.

[b]20 *rev. ed.* (for 1866) 1868; *issued 1870.* 447p. illus. 23pl. (lith.) Q.

Contents: Report of Chancellor, p. 9-12; Account, p. 15; Additions 1866, p.17-20; Catalogues of Shells presented by Smithsonian Institution, p.21-60; List of Specimens in Economic Collection, p.61-63; Catalogue of Books 1866, p. 64-66; Wilson, W. D. Local Climatology, p. 67-106; Results of Meteorological Observations, p. 107-41; Peters, C. H. F. Longitude of Western Boundary Line of State of New York, p. 143-57; Peck, C. H. Flora of the State, p. 159-66; Whitfield, R. P. Observations on the Internal Appendages of the Genus Atrypa, p. 167-72. 1 pl.; Notice of v. 4 of Palaeontology of New York, p. 173-99; Hall, James. Introduction to the Study of the Graptolitidae, p. 201-75. 4 pl.; Hall, James. Contributions to Palaeontology, p.277-345; Hall, James. New or Little Known Species of Fossils from Rocks of the Age of the Niagara Group, p. 347-438. 17 pl.

21 (for 1867) 1871. 7+190p. illus. 9pl. (phot.) 4 maps. O.

Contents: Report of Chancellor, pref. p. 5-6; Account, pref. p. 7; Report of Curator, p. 5-12; Additions 1867, p. 13-19; Schedule of Contents of

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[a] Titles of these three papers appear in the table of contents, but the papers were never published, except the first which was printed in the Transactions of the American Philosophical Society. 1869. 13:329-41.

[b] 300 copies printed.

Pickett Collection, p. 20-21; Report of Botanist, p. 23-24; Morgan, L. H. Stone and Bone Implements of the Arickarees, p. 25-46. 6 pl.; Hunt, T. S. On the Mineralogy of the Laurentian Limestones of North America, p. 47-98; Hall, James. Cohoes Mastodon, p. 99-148. 2 pl. 4 maps; Index to Reports 1-20 Exclusive of Geologic and Palaeontologic Papers, p. 149-90.

22 (for 1868) 1869. 7+113 p. map. O.

Contents: Report of Chancellor, pref. p. 5; Account, pref. p. 6; Report of Curator, p.1-7; Additions 1868, p.9-16; Aldrich, T. H. Partial List of Shells found near Troy, N. Y., p.17-24; Report of Botanist, p.25-106; Merriam, C. L. Meteorological Report, p. 107-8; Hough, F. B. Early Observations upon Magnetic Variations, p. 109-13.

23 (for 1869) 1873. 9+252p. 14pl. (lith.) O.

Contents: Report of Chancellor, pref. p. 7-8; Account, pref. p. 9; Report of Curator, p. 5-15; Additions 1869, p. 17-26; Report of Botanist, p. 27-135. 6 pl.; Lintner, J. A. Entomological Contributions, p. 137-216. 2 pl.; Speyer, A. On Cucullia Intermedia *n. sp.* and C. Lucifuga W. V., p. 217-22; Hall, James & Whitfield, R. P. Descriptions of Devonian Fossils, p. 223-43. 4 pl.; Hall, James. New or Imperfectly Known Forms among the Brachiopoda, p. 244-47. 2 pl.; Hall, James. Reply to a Note on a Question of Priority, p. 248-52.

24 (for 1870) 1872. 7+232p. 9pl. (lith.) O.

Contents: Report of Chancellor, pref. p. 5; Account, pref. p. 7; Report of Director, p.5-16; Additions 1870, p.17-32; List of Mounted Fishes, p. 33-37; List of Fishes Received from the Smithsonian Institution in 1865, p. 39-40; Report of Botanist, p. 41-108. 4 pl.; Lintner, J. A. Entomological Contributions no. 2, p. 109-70; Colvin, Verplanck. Ascent of Mt Seward and its Barometrical Measurement, p. 171-80. 1 pl.; Hall, James & Whitfield, R. P. New Species of Fossils from the Vicinity of Louisville, Kentucky, and the Falls of the Ohio, p. 181-200a. 5 pl. in 27th rep.; Hall, James & Whitfield, R. P. Some Peculiar Impressions in Sandstone of Chemung Group, p. 201-4; Hall, James. New Species of Crinoidea and other Fossils from Strata of the Age of the Hudson River Group and Trenton Limestone, p. 205-24. 3 pl.; Hall, James. New Species of Fossils from the Hudson River Group in the Vicinity of Cincinnati, Ohio, p. 225-32. 1 pl.

25 (for 1871) 1873. 7+123p. 2pl. (lith.) O.

Contents: Report of Chancellor, pref. p. 7; Report of Director, p. 5-13; Additions 1871, p.15-26; Contents of Gebhard Collection, p.27-33; Long Island Mollusca presented, p.35-38; Catalogue of European Shells presented by the Smithsonian Institution in 1869, p. 39-55; Report of Botanist, p. 57-123. 2 pl.

26 (for 1872) 1874. 6+192 p. illus. O.

Contents: Report of Chancellor, pref. p. 5-6; Report of Director, p. 5-15; Additions 1872, p.17-25; List of Iron Ores in Economic Collection, p.27-30; Record of Borings of Gardner Oil Well no. 3 at East Shamburg, Pennsylvania, p. 31-33; Report of Botanist, p. 35-91; Hall, James. Descriptions of Bryozoa and Corals of the Lower Helderberg Group, p. 93-116; Lintner, J. A. Entomological Contributions no. 3, p. 117-92.

27 (for 1873) 1875. 7-148p. 7pl. (lith.) map. O.

Contents: Report of Chancellor, pref. p. 7; Report of Director, p. 5-21; Additions 1873, p.23-40; List of Rock Specimens from Cumberland, Eng. p.41-42; List of Land and Fresh Water Shells presented by T. H. Aldrich, p. 43-46; List of Gould types of Mollusca in Museum Collection, p. 47-55; List of Building Stones in Economic Collection, p.57-71; Report of Botanist, p. 73-116, 2 pl.; Hall, James. The Niagara and Lower Helderberg Groups; their Relations and Geographical Distribution, p. 117-31; Hall, James. Descriptions of New Species of Goniatitidae, p.132-36; Lintner, J. A. Entomological Contributions, p.137-48.

28 (for 1874) 1879. 7+210p. 37pl. (lith.) O. (State Museum ed.)

Contents: Report of Chancellor, pref. p. 7; Report of Director, p. 5-16; Additions 1874, p.17-30; Report of Botanist, p.31-88. 2 pl.; Walcott, C. D. Discovery of the Remains of the Natatory and Branchial Appendages of Trilobites, p. 89-92; Walcott, C. D. New Species of Fossils from the Trenton Limestone, p. 93-97; Hall, James. Fauna of the Niagara Group in Central Indiana, p. 99-203. 32 pl.; Some Remarkable Crinoidal Forms from the Lower Helderberg Group, p. 205-10. 3 pl.

29 (for 1875) 1878. 82p. 2pl. (lith.) O.

Contents: Report of Chancellor, p. 7; Report of Director, p. 11-18; Additions 1875, p. 19-28; Report of Botanist, p. 29-82. 2pl.

30 (for 1876) 1878. 7+256 p. 4 pl. (lith.) O.

Contents: Report of Chancellor, pref. p. 7; Report of Director, p. 5-12; Additions 1876, p. 13-22; Report of Botanist, p. 23-78. 2 pl.; Leeds, A. R. Lithology of the Adirondacks, p. 79-109; Hall, J. W. & Fritz-Gaertner, R. On the Structure of Astraeospongia meniscus, p.111-16. 1 pl.; Lintner, J. A. Entomological Contributions no. 4, p.117-254; Hall, James. Genus Plumalina, p.255-56. 1 pl.

31 (for 1877) 1879. 6+78p. 1pl. (lith.) O.

Contents: Report of Chancellor, pref. p.4; Report of Director, p.5-10; Additions 1877, p. 11-17; Report of Botanist, p. 19-60; Walcott, C. D. Some Sections of Trilobites from the Trenton Limestone, p. 61-65. 1 pl.; Walcott, C. D. Eggs of the Trilobite, p. 66-67; Walcott, C. D. New Species of Fossils from the Chazy and Trenton Limestones, p.68-71; Fritz-Gaertner, R. Phlogopyte, p. 72-78.

32 (for 1878) 1879. 7+176 p. O.

Contents: Report of Chancellor, pref. p.7; Report of Director, p.5-9; Additions 1878, p. 10-16; Report of Botanist, p. 17-72; Peck, C. H. Mosses of Caledonia Creek, p. 73-74; Lintner, J. A. Insects and Other Animal Forms of Caledonia Creek, N. Y., p. 75-99; Webster, H. E. Annelida chaetopoda of New Jersey, p.101-28; Walcott, C. D. New Species of Fossils from the Calciferous Formation, p. 129-31; Hall, C. E. Laurentian Magnetic Iron Ore Deposits in Northern New York, p. 133-40; Hall, James. Bryozoa and Corals of the Lower Helderberg Group, p. 141-76.

33 (for 1879) 1880. 49p. 2pl. (lith.) O.

Contents: Report of Chancellor, p. 3-4; Report of Director, p. 5-10; Report of Botanist, p. 11-49. 2 pl.

34 (for 1880) 1881. 58p. 4pl. (lith.) O.

Contents: Report of Chancellor, p. 3-4; Report of Director, p. 5-12; Additions 1880, p.13-19; Additions to the Library 1880, p.20-23; Report of Botanist, p. 24-58. 4 pl.

35 (for 1881) 1884. 481 p. 30 pl. (lith.) map. O.

Contents: Report of Chancellor, p. 5-6; Report of Director, p. 7-11; Additions 1881, p.13-18; Distribution of Duplicate Fossils and Minerals, p.19-27; List of Species in each of Ten Duplicate Collections of Fossils for High Schools and Academies, p.29-32; List of Species and Specimens of Cephalopoda, p.33-66; Crinoidea from Tentaculite Limestone, p.67; List of Unionidae of the Gould Collection, p.68-81; List of Unionidae of the New York State Collection, p.82-83; List of Unionidae of the General Collection, p.84-101; List of Land Shells of the New York State Collection, p.102-6; List of Corbiculadae of the New York State Collection, p.107; List of Land Shells of the United States in the Museum Collection, p.108-11; List of Shells presented in 1875 by Dr James Lewis, p.112-17; Statistics Relating to the State Museum, as compiled from the Report made to the Tenth Census of the United States Jan. 4, 1882, p. 118-19; Hall, J. W. Machinery and Methods of Cutting Specimens of Rocks and Fossils, p.121-24. 2 pl.; Report of Botanist, p.125-64; De Tarr, D. N. List of the Rhizopoda found in the Vicinity of Albany, N. Y., p. 165-67; Simpson, G. B. Anatomy and Physiology of Anodonta fluviatilis, p.169-91, 11 pl.; Wright, S. H. Aboriginal Work on Bluff Point, Yates co. N. Y., p. 193-94. 1 pl.; Wright, B. H. Geology of Yates County, N. Y., p. 195-206. 3 pl.; Walcott, C. D. New Species of Fossils from the Trenton Group of New York, p. 207-14. 1 pl.; Hall, James. Lamellibranchiate Shells of the Upper Helderberg, Hamilton and Chemung Groups, p. 215-406g; Hall, James. Fossil Corals from the Niagara and Upper Helderberg Group, p. 407-64. 8 pl; Hall, James. Species of Fossil Reticulate Sponges Constituting the Family Dictyospongidae, p.465-82. 4pl.

36 (for 1882) 1883. 94p. 6pl. (lith.) O.

Contents: Report of Chancellor, p. 7-8; Report of Director, p. 9-15; Additions 1882, p. 17-20; List of Niagara fossils from Waldron, Indiana, p.21-25; List of Genera and Species of Brachiopoda of which Sections have been prepared for the Microscope, p.26; Report of Botanist, p.27-49; Beecher, C. E. Some Abnormal and Pathologic Forms of Fresh-water Shells from the Vicinity of Albany, N. Y., p. 51-55. 2 pl.; Hall, James. Bryozoa of the Hamilton Group, p. 57-72; Hall, James. On the Structure of the Shell in the Genus Orthis, p. 73-75. 2 pl.; Hall, James. New Species of Stylonurus from the Catskill Group, p. 76-77. 1 pl.; Beecher, C. E. List of Species of Fossils from an Exposure of Utica Slate and Associated Rocks within the Limits of the City of Albany, p.78; Murray, David, *comp.* Catalogue of the Published Works of James Hall, p. 79-94; Illustration of Cryptozoön, pl.6.

37 (for 1883) 1884. 68 p. O.

Contents: Report of Vice-chancellor, p. 7-9; Act to regulate the State Museum and the Publication of the Palaeontology of the State, p. 11-12; Contract between the State of New York by the Trustees of the State

Museum and Charles H. Van Benthuysen, p. 12-16; Contract between the State of New York by the Trustees of the State Museum and James Hall, State Geologist, p.16-18; Report of Director, p.19-24; Current Work, p.25; Additions 1883, p.27-31; Catalogue of Translucent Sections of Rocks and Fossils, p.33-43; Report of Entomologist, p.47-60; aReport of Botanist, p. 63-68.

38 (for 1884) 1885. 138p. 3pl. (lith.) O.

Contents: Report of Chancellor, p. 3-5; Report of Director, p. 7-15; Additions 1884, p.16-20; List of Minerals in the General Collection, p. 21-60; Report of Geologist, p. 61-65; Report of Entomologist, p. 67-76; Report of Botanist, p. 77-138. 3 pl.

39 (for 1885) 1886. 229p. 12pl. (lith.) map. O.

Contents: Report of Chancellor, p. 7-8; Report of Director, p. 9-14; Additions 1885, p. 15-29; Report of Botanist, p. 30-73. 2 pl.; Report of Entomologist, p. 77-125; Simpson, G. B. Anatomy of the Snail, p. 127. 1 pl.; Webster, H. E. Annelida chaetopoda of New Jersey, p.128-59. 7 pl.; Hall, James. Obscure Organisms in Roofing Slates of Washington County, N. Y., p. 160. 1 pl.; Beecher, C. E. A Spiral Bivalve Shell from the Waverly Group of Pennsylvania, p. 161-63. 1 pl.; Smock, J. C. Crystalline Rock Region of Dutchess, Putnam and Westchester Counties, N. Y., p. 166-85; Hall, James. Building Stones, p. 186-225; Report of Geolcgist, p. 226-29.

40 (for 1886) 1887. 163 p. O.

Contents: Report of Vice-chancellor, p. 5-8; Report of Director, p. 11-19; Additions 1886, p. 21-34; Smock, J. C. Report of Field Work for 1886, p. 35-36; Report of Botanist, p. 37-77; Report of Entomologist, p. 79-154; Report of Geologist, p. 155-63 (Supplement to Geol. rep. 6).

41 (for 1887) 1888. 410p. illus. 9pl. (lith.) map. O.

Contents: Report of Chancellor, p. 9-11; Report of Director, p. 13-25; Additions 1887, p.27-34; Additions to Library, p.35-43; Catalogue of Gems and Precious Stones, p.44-48; Report of Botanist, p.49-122. 1 pl.; Report of Entomologist, p. 123-358; Report of Geologist, p. 359-410, 8 pl.

Contents of Geol. rep. 7 in Mus. rep. 41: Palaeontology of New York, v. 6, p. 361-78; Beecher, C. E. Synoptical Table of the Genera and Species described in v. 6 of the Palaeontology of New York, p. 363-75; Synopsis of Contents of Palaeontology of New York v. 7, p. 378-80; Hall, James. Palaeontology of New York v. 8, p. 381-82; Beecher, C. E. Statement of Condition of Work on Brachiopoda, Palaeontology of New York, v. 8, p. 383-84; Beecher, C. E. Lamellibranchiata. List of Genera Illus. and not Illus. on Plates of Geol. Rep. for 1882, p.385-87; Clarke, J. M. Supposed Mastodon Bones Found at Attica, N. Y., p. 388-90. 1 pl.; Hall, James. Description of New Species of Fenestellidae of the Lower Helderberg; with explanation of plates illus. species of the Hamilton group, described in Geol. rep. for 1886, p. 391-410. 8 pl.

42 (for 1888) 1889. 496p. illus. 3pl. (lith.) O.

Contents: Report of Chancellor, p. 9-13; Report of Director, p. 17-36. 1 pl.; Report of Assistant in Charge, p. 37-49; Additions to Collections,

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aTitles of four articles are enumerated but not printed here. The articles appear in Mus. bul. 2.

p.50-64; Additions to Library, p.65-74; Murray, David. Catalogue of Publ'shed Works of James Hall, p.75-97; Report of Botanist, p.99-144. 2 pl.; Report of Entomologist, p. 145-347; Report of Geologist, p. 349-496.

Contents of Geol. rep. 8 in Mus. rep. 42: Report of Geologist, p. 351-402; Palaeontology of New York, v. 7, p. 351-69; List of Type Specimens of Devonian Crustacea described in Palaeontology of New York v. 7, in the Possession of Museum, p. 370-73; Palaeontology of New York v. 8, p. 373-88; Clarke, J. M. Genera of the Palaeozoic Brachiopoda, p. 389-92; List of Microscopic Sections of Brachiopoda, p.392-93; List of Preparations for v. 8, p.393-94; List of Plates of Brachiopoda, p.394-95; Schuchert, Charles. List of Fossils in the Oriskany Sandstone of Maryland, New York and Ontario, p. 396-400; Clarke, J. M. Genus Bronteus in the Chemung Rocks, p.403-5; Clarke, J. M. List of Species Constituting the known Fauna and Flora of Marcellus Epoch in N. Y., p. 406-7; Clarke, J. M. Hercynian Question, p. 408-37; Bishop, I. P. Locality of Flint Implements in Wyoming County, N. Y., p. 438-40; Catalogue of Specimens Representative of the Taconic System, p.441-44; List of Plates, Drawings, names of Draughtsmen and Lithographers for Palaeontology of New York v. 5, pt 1 and 2, v. 7 and 8, p.445-49; Record of Locality Numbers, p. 450-96.

43 (for 1889) 1890. 274p. illus. 4pl. (lith.) map. O.

Contents: Report of Assistant in Charge, p. 11-20; Additions to collections, p. 21-37; Additions to Library, p. 37-47; Report of Botanist, p. 49-97. 4 pl.; Report of Entomologist, p.99-205; Report of Geologist, p. 207-74.

Contents of Geol. rep. 9 in Mus. rep. 43: Report of Geologist, p. 209-27; Palaeontology of New York v. 8, p. 209-18; Geological Map of the State of New York, p. 218-27; Hall, James. Fossil Dictyospongidae of the Devonian and Carboniferous Formations, p. 227-29; Schuchert, Charles. On Syringothyris, Winchell, and its American Species, p.230-39; Schuchert, Charles. List of Species of the American Palaeozoic Orthis, Spirifera, Spiriferina and Syringothyris, p.240-57; Hall, James. New Forms of Dictyospongidae from the Rocks of the Chemung Group, p.258-62; Record of Locality Numbers, p.263-74.

44 (for 1890) 1892. 405 p. illus. 12 pl. (lith.) O.

Contents: Report of Director, p. 11-16; Report of Assistant in Charge, p.17-21; Additions to Collections, p.22-26; List of Catalogues of Shells published in Former Annual Reports, p.27; Catalogue of Mounted Mammals in the Collection, Sep. 30, 1890, p.28-30; Catalogue of the Collection of Mammalian Osteology, p.31-33; Report of Geologist, p.35-114, 5 pl.: Report of Botanist, p. 115-87. 4 pl.; Report of Entomologist, p. 197-405. 3 pl.

Contents of Geol. rep. 10 in Mus. rep. 44: Report of Geologist, p. 37-55; Palaeontology of New York v. 8, p. 37-44; Clarke, J. M. Genera of the Palaeozoic Brachiopoda, p.45-48; Original Drawings for Palaeontology of New York v. 8, p. 49; List of Figures for v. 8, p.49-51; Lists of Microscopic Sections of Brachiopoda, p.52-53; Clarke, J. M. Report of Assistant Palaeontologist, p.59-61; List of Accessions to the Depart-

ment of Palaeontology, p. 62-64; Hall, James. Descriptions of Bryozoa, p. 65-87; Clarke, J. M. Genus Acidaspis, p. 91-101. 3 pl.; Clarke, J. M. Coronura aspectans, p.105-9. 1 pl.; Clarke, J. M. Terataspis grandis, p.111-14, 1 pl.; (Additional papers in geologist's edition).

45 (for 1891) 1892. 616p. illus. 2pl. (phot.) map. O.

Contents: Report of Director, p. 11-13; Report of Assistant Director, p. 14; Report of Assistant Zoologist, p. 15-19; Additions to Collections, p. 20-28; Catalogue of Muricidae, p. 29-45; Marshall, W. B. A Deposit of Marl and Peat in the Town of New Baltimore, p. 46-52; Bishop, I. P. Salt Industry of Central New York, p. 53-61; Report of Botanist, p. 63-102; Report of Entomologist, p. 103-320. 2 pl.; Report of Geologist, p. 321-616.

Contents of Geol. rep. 11 in Mus. rep. 45: Report of Geologist, p. 323-45; Livonia Salt Shaft, p. 326-28; Palaeontology of New York, v. 8, p. 328-29; Clarke, J. M. List of Preparations of Spirals, Loops and Hinge-plates for v.8, pt2, p.330-31; List of Genera of Palaeozoic Brachiopoda, p.331-37; Additions to Palaeontological Collections, p. 338-44; Clarke, J. M. Catalogue of the Collection of Geological and Palaeontological Specimens Donated by the Albany Institute, p.347-69; Clarke, J. M. Report of Assistant Palaeontologist, p. 370-71; Clarke, J. M. List of Original and Illustrated Specimens in the Palaeontological Collections, pt 1, Crustacea, p. 373-437; Record of Localities of Extra Limital Geological and Palaeontological Collections, p.438-39; Clarke, J. M. On Cordania, a Proposed New Genus of Trilobites, p. 440-43; Publications of Geologist, p.444-47; Hall, James & Clarke, J. M. Introduction to the Study of the Brachiopoda, p. 449-616.

46 (for 1892) 1893. 495 p. illus. O.

Contents: Report of Director, p. 11, 62-81; Report of Assistant Director, p.12-14; Report of Assistant Zoologist, p.15-61; Additions to Zoological Collections, p.21-27; Catalogue of Zoological Collections, p.29-61; Collections of Fossils made for Palaeontology of New York Previous to 1883, p.62-65; List of Boxes of Fossils in State Hall, p.66-74; Additions to Collections in Geology and Palaeontology, p.75-77; School Collections, p.77-79; Museum Publications, p.79-81; Report of Botanist, p.83-149; Report of Geologist, p.151-288; Report of Entomologist, p.289-495.

Contents of Geol. rep. 12 in Mus. rep. 46: Report of Geologist, p. 153-87; Palaeontology of New York v. 8, pt 1, p. 160-68; Palaeontology of New York v. 8, pt 2, p. 169-71; Geological Map of the State of New York, p. 171-84; Geological Surveys and Maps of Part of the State of New York, p.184-85; Clarke, J. M. Report of Assistant Palaeontologist, p.189-95; Additions to the Geological and Palaeontological Collections 1891-92, p.196-99; Clarke, J. M. List of Original and Illustrated Specimens in the Palaeontological Collections, pt 2, Annelida and Cephalopoda, p. 201-50; Emerson, B. K. Two Boulders of a very Basic Eruptive Rock from the West Shore of Canandaigua Lake, p.251-55; Prosser, C. S. Devonian Section of Central New York along the Unadilla River, p. 256-88.

47 (for 1893) 1894. 1137p. illus. pl. (phot.) maps. O.

Contents: Report of Director, p. 9-19; Report of Assistant Palaeontologist, p.17; Additions to Palaeontological Collection, p.18; Report of Assistant Director, p.21-30; Report of Assistant Zoologist, p.30-34; Additions to Collections, p.35-40; World's Fair Exhibits, p.41-75; Catalogue of Zoological Collections, p.77-128; Report of Botanist, p.129-74; Report of Entomologist, p. 175-97; Report of Geologist, p. 199-1137.

Contents of Geol. rep. 13 in Mus. rep. 47: Hall, James. Livonia Salt Shaft, its History and Geological Relations, p. 203-14; Luther, D. D. Geology of the Livonia Salt Shaft, p. 215-324; Clarke, J. M. Succession of the Fossil Faunas in the Section of the Livonia Salt Shaft, p. 325-52; Clarke, J. M. New or Rare Species of Fossils from the Horizons of the Livonia Salt Shaft, p. 353-83; Geological Survey of the State of New York, Reports, p. 385-751; Darton, N. H. Relations of the Helderberg Limestones and Associated Formations in Eastern New York, p. 391-422; Darton, N. H. Geology of Albany County, p. 423-55; Nason, F. L. Economic Geology of Albany County, p. 457-81; Darton, N. H. Geology of Ulster County, p. 483-566; Nason, F. L. Economic Geology of Ulster County, p. 567-600; Darton, N. H. Geology of the Mohawk Valley in Herkimer, Fulton, Montgomery and Saratoga Counties, p.601-23; Kemp, J. F. Geology of Essex County, p.625-66; Cushing, H. P. Geology of Clinton County, p. 667-83; Smyth, C. H. jr. Geology of Four Townships in St Lawrence and Jefferson Counties, N. Y., p. 685-709; Randall, F. A. Geology of Cattaraugus and Chautauqua Counties, p. 711-21; Clarke, J. M. Field Work in Chenango County, p.723-51; Clarke, J. M. *comp.* List of Publications relating to the Geology and Palaeontology of New York 1876-93, p.753-91; *Department of Palaeontology (v. 2 of Geol. rep.)* p.793-1137: Palaeontology of New York v. 8, pt 2, p. 797-802; Clarke, J. M. Evolution of the Genera of the Palaeozoic Brachiopoda, p.803-40; Description of New Species figured in v. 8, pt 2 of Palaeontology of New York, p. 841-51; Sherzer, W. H. Platycnemic man in New York, p. 853-77; Simpson, G. B. Genera of Fenestellidae, p.879-921; Simpson, G. B. Glossary and Explanations of Specific Names of Bryozoa and Corals, p.923-41; Hall, James & Clarke, J. M. Introduction to the Study of the Brachiopoda, pt 2, p.943-1137.

48 (for 1894) 1895. v.1, 650p.+p. 93-595, illus. pl. (phot.) maps. O. v. 2 (Report of Geologist), 669p. illus. 44 pl. (lith.) other pl. (phot.) maps. O. v. 3, 44 pl. (lith.) (on edible fungi). O.

Contents, v. 1: Report of Director, p.11-39; List of Accessions, p.13; List of Awards to Mineral Exhibit at World's Fair, p.14-15; Catalogue of New York Woods, p.16-20; Catalogue of Building Stones, p.21-31; Catalogue of Rock Specimens collected by Kemp, p.32-39; Report of Geologist, p. 41-44; Marshall, W. B. Geographical Distribution of New York Unionidae, p. 45-99; Report of Botanist, p. 101-337. 44 pl. in v. 3; Report of Entomologist, p.339-635; Report of Assistant Zoologist, p. 637-47; Marshall, W. B. List of Shells Inhabiting the Vicinity of Albany and Troy, N. Y., p. 641-47; Index, p. 648-50; Bulletin 12, Ries, Heinrich. Clay Industries of New York, p. 93-262 (2d paging); Bulletin 13, Lintner, J. A. San José Scale, Aspidiotus perniciosus and Some

Other Destructive Scale Insects of New York State, p.263-305 (2d paging); Bulletin 14, Kemp, J. F. Geology of Moriah and Westport Townships, Essex co., p.323-55 (2d paging); Bulletin 15, Merrill, F. J. H. Mineral Resources of New York State, p.359-595 (2d paging);

Contents of Geol. rep. 14 in Mus. rep. 48 v. 2: Staff of geologist, p. 5; Report of Geologist and Palaeontologist, p.7-29; Preface to Palaeontology of New York, v. 8, pt 2, p. 21-28; Geological Survey of the State of New York, Reports, p. 31-125; Darton, N. H. Faulted Region of Herkimer, Fulton, Montgomery and Saratoga Counties, p. 31-53; Beecher, C. E. & Hall, C. E. Field Notes on the Geology of the Mohawk Valley, p. 54-56; Lincoln, D. F. Geology of Seneca County, p. 57-125; Bernard, Felix. Principles of Palaeontology ed. by J. M. Clarke, p.127-215; Ruedemann, Rudolf. Development and Growth of Diplograptus, p. 217-49. 5 pl.; Girty, G. H. Revision of the Sponges and Coelenterates of the Lower Helderberg group of New York, p. 259-309. 7 pl.; Hall, James & Clarke, J. M. New Species of Brachiopoda Described in Palaeontology of New York v. 8, pt 1 and 2, p. 323-72. 14 pl.; Simpson, G. B. Handbook of the Genera of the North American Palaeozoic Bryozoa, p. 403-669. 30 pl.

49 (for 1895) v. 1, 1897, v. 2-3, 1898. v. 1, 6+334p. illus. 6 pl. (lith.) other pl. (phot.) O. v. 2 (Report of Geologist) 738p. illus. pl. (phot.) maps. Q. v. 3 (Report of Geologist) p.739-984. illus. 47 pl. (lith.) Q.

Contents, v. 1: Report of Director, p. 1-10; Additions to Collections, p. 9-10; Report of Geologist and Paleontologist, p.11-15; Report of Botanist, p.17-83. pl.44-49; Report of Entomologist, p.85-329; Index, p.331-34.

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50 (for 1896) v. 1, 1898, v. 2, 1899. v. 1, 4+403+134p. illus. pl. (phot.) maps. O. v. 2 (Report of Geologist), 8+448p. illus. 32pl. (lith.) other pl. (phot.) maps. Q.

Contents, v. 1: Report of Director, p.1-20; Additions to Museum Collections, p.12-20; Geology of Crystalline Rocks of Southeastern New York, p.21-31; Origin of Serpentines in the Vicinity of New York, p. 32-44; Public Geologic and Mineralogic Collections in the United States and Canada, p. 45-74; Index to Report of Director, p. 75-76; Report of Botanist, p. 77-159; Report of Entomologist, p. 161-403; Bulletin 16, Beauchamp, W. M. Aboriginal Chipped Stone Implements, p. 3-84 (2d paging); Bulletin 17, Merrill, F. J. H. Road Materials and Road Building in New York p. 87-134 (2d paging).

Contents of Geol. rep. 16 in Mus. rep. 50 v. 2: Report of Geologist and Palaeontologist, pref. p.7-8; Geological Survey of the State of New York, Reports, p.1-27, 171-226; Cushing, H. P. Boundary Between the Potsdam and Precambrian Rocks North of the Adirondacks, p. 1-27; Clarke, J. M. Naples Fauna in Western New York, p. 29-161. 9 pl.; Clarke, J. M. Early Stages of Certain Goniatites, p. 163-69; Luther, D. D. Brine Springs and Salt Wells of New York and the Geology of the Salt District, p.171-226; Grabau, A. W. Faunas of the Hamilton Group of Eighteen-mile Creek and Vicinity in Western New York, p. 227-339; Hall, James & Clarke, J. M. Memoir on the Palaeozoic Reticulate Sponges Constituting the Family Dictyospongidae, pt 2, p. 341-448. pl. 48-70.

51 (for 1897) 1899. v.1, r153+410p. illus. 9pl. (lith.) other pl. (phot.) maps. O. v.2 (Report of Geologist), 564p. illus. pl. (phot.) maps. O.

Contents, v.1: Report of Director, p.r5-13; Additions to Collections, p.r13-20; White, T. G. Relations of the Ordovician and Eo-Silurian Rocks in Portions of Herkimer, Oneida and Lewis Counties, p.r21-54; Watson, T. L. Some Higher Levels in the Postglacial Development of the Finger-lakes, p.r55-117; Nevius, J. N. Talc Industry of St Lawrence County, N. Y., p.r119-27; Nevius, J. N. History of Cayuga Lake Valley, p.r129-53; Bulletin 18, Beauchamp, W. M. Polished Stone Articles Used by the New York Aborigines, p.3-102; Bulletin 19, Merrill, F. J. H. Guide to the Study of the Geological Collections of the New York State Museum, p.105-262; Report of Botanist, p.263-321. 9 pl.; Report of Entomologist, p.327-90; General Index, p.391-410.

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52 (for 1898) 1900. v.1, r111+695p. illus. 6pl. (lith.) other pl. (phot.) maps. O. v.2 (Report of Geologist), 169p. illus. pl. (phot.) maps. O.

Contents, v.1: Report of Director, p.r5-17; Accessions to Collections, p.r18-32; Bagg, R. M. jr. Report of Work on the Collections of Mesozoic and Cenozoic Fossils in Geological Hall, p.r32-40; Catalogue of Mesozoic and Cenozoic Fossils, p.r40-46; Catalogue of European Fossils presented by Murchison, p.r47-71; Bagg, R. M. jr. *comp.* Synoptic Catalogue of Fossils, p.r71-78; Nevius, J. N. Fossil Plant from Orange County, p.r79-81; Nevius, J. N. Sacandaga Mining and Milling Co. and the Sutphen Process, p.r82-87; Ries, Heinrich. Notes on a Trip from Port Jervis to Rondout, p.r88-91; Bean, T. H. Fishes of Long Island, p.r92-111; Bulletin 20, Felt, E. P. Elm-leaf Beetle in New York State, p.1-43. 1pl.; Bulletin 21, Kemp, J. F. Geology of Lake Placid Region, p.47-67; Bulletin 22, Beauchamp, W. M. Earthenware of New York Aborigines, p.71-146; Bulletin 23, Report of Entomologist, p.151-295; Bulletin 24, Felt, E. P. Memorial of Life and Entomologic Work of J. A. Lintner, p.301-611; Bulletin 25, Report of Botanist, p.617-88. 5 pl.; General Index, p.689-95.

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53 (for 1899) 1901. v.1, r170+867p. 4pl. (lith.) other pl. (phot.) maps. O. v.2, 234p. 33pl. (lith.) Q.

Contents, v.1: Report of Director, p.r5-170; Report of Geologist, p.r7-154; Additions to Collections, p.r163-70; Bulletin 26, Felt, E. P. Collection, Preservation and Distribution of New York Insects, p.3-34; Bulletin 27, Felt, E. P. Shade Tree Pests in New York State, p.39-60; Bulletin 28, Peck, C. H. Plants of North Elba,p .65-266; Bulletin 29, Miller, G. S. jr. Preliminary List of New York Mammals, p.271-390; Bulletin 30, Orton, Edward. Petroleum and Natural Gas in New York, p.395-526; Bulletin 31, Report of Entomologist, p.531-653; [a]Report of Paleontologist, p.659-816; Report of Botanist, p.821-67. 4pl.; General Index, p.657-61.

v.2: Memoir 3, Clarke, J. M. Oriskany Fauna of Becraft Mountain, p.1-128. 9pl.; Memoir 4, Peck, C. H. Edible Fungi of New York, p.129-234. 24pl.

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[a] For contents see Paleontologist's reports, p. 262.

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54 (for 1900) 1902. v.1, r261+195+484p. 17pl. (lith.) other pl. (phot.) O. v.2, p.489-1063, 2pl. (lith.) other pl. (phot.) O. v.3, 968p. 37pl. (lith.) other pl. (phot.) O. v.4, 664p. 13pl. (lith.) other pl. (phot.) O.

Contents, v.1: Report of the Director and State Geologist, p.r3-261; Tests of Road Metal, p.r14-22; Cushing, H. P. Recent Geologic Work in Franklin and St Lawrence Counties, p.r23-82; Cushing, H. P. Pre-Cambrian Outlier at Little Falls, Herkimer co., p.r83-95; Finlay, G. I. Preliminary Report of Field Work in the Town of Minerva, Essex co., p.r96-102; Fairchild, H. L. Pleistocene Geology of Western New York, Report of Progress for 1900, p.r103-39; Eckel, E. C. The Quarry Industry in Southeastern New York, p.r141-76; Parsons, A. L. Recent Developments in the Gypsum Industry in New York State, p.r177-83; Accessions to Collections, p.r201-7; Stoller, J. H. Two New Land Isopods, p.r208-13; Scott, G. G. Notes on the Marine Food Fishes of Long Island and a Biologic Reconnaissance of Cold Spring Harbor, p.r214-29; Converse, H. M. Iroquois Silver Brooches, p.r231-54; Index, p.r255-61; Report of State Paleontologist 1900, p.3-124; Report of State Botanist 1900, p.129-99. 13pl.; Bulletin 32, Beauchamp, W. M. Aboriginal Occupation of New York, p.3-187; Bulletin 33, Farr, M. S. Check List of New York Birds, p.193-409; Bulletin 34, Cumings, E. R. Lower Silurian System of Eastern Montgomery County, Prosser, C. S. Notes on the Stratigraphy of the Mohawk Valley and Saratoga County, N. Y. p.415-84.

v.2: Bulletin 35, Ries, Heinrich. Clays of New York, p.489-944; Bulletin 36, Felt, E. P. 16th Report of State Entomologist, p.949-1063.

v.3: Bulletin 37, Felt, E. P. Illustrated Descriptive Catalogue of Injurious and Beneficial Insects of New York State, p.3-52; Bulletin 38, Miller, G. S. jr. Key to the Land Mammals of Northeastern North America, p.59-160; Bulletin 39, Clarke, J. M., Simpson, G. B. & Loomis, F. B. Paleontologic Papers, p.165-231; Bulletin 40, Simpson, G. B. Anatomy and Physiology of Polygyra Albolabris and Limax Maximus, p.237-314; Bulletin 41, Beauchamp, W. M. Wampum and Shell Articles Used by the New York Indians, p.319-480; Bulletin 42, Ruedemann, Rudolf. Hudson River Beds near Albany and their Taxonomic Equivalents, p.485-596; Bulletin 43, Kellogg, J. L. Clam and Scallop Industries of New York State, p.601-31; Bulletin 44, Ries, Heinrich. Lime and Cement Industries of New York, p.639-968.

v.4: Bulletin 45, Grabau, A. W. Guide to the Geology and Paleontology of Niagara Falls and Vicinity, p.3-284; Bulletin 46, Felt, E. P. Scale Insects of Importance and List of the Species in New York State, p.289-377; Bulletin 47, Needham, J. G. and Betten, Cornelius. Aquatic Insects in the Adirondacks, p.383-612; Bulletin 48, Woodworth, J. B. Pleistocene Geology of Portions of Nassau County and Borough of Queens, p.617-70; General Index, p.673-79.

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Geologist's annual reports for 1881-1900. Rep'ts 1, 3-13, 17-date, O; 2, 14-16, Q. 1881-1902.

The annual reports of the early natural history survey, 1837-41 are out of print.

Reports 1-4, 1881-84 were published only in separate form. Of the 5th report 4 pages were reprinted in the 39th museum report, and a supplement to the 6th report was included in the 40th museum report. The 7th and subsequent reports are included in the 41st and following museum reports, except that certain lithographic plates in the 11th report (for 1891) and 13th report (for 1893) are omitted from the 45th and 47th museum reports.

Separate volumes of the geologist's 12th and 20th reports can be supplied for 50 cents; 14th, 17th and 18th for 75 cents each; 15th and 16th for $1 each; 19th for 40 cents. Others, except as parts of museum reports, are not available.

In 1898 the paleontologic work of the State was made distinct from the geologic and will hereafter be reported separately.

1 (for 1881) 1884. 15p. 11pl. (lith.) O.

Contents: Report of Geologist, p.3-7; Classification of the Lamellibranchiata, p.8-15. 11pl.

2 (for 1882) 1883. 17p. illus. 61pl. (lith.) Q.

Contents: Report of Geologist, p.1-3; Hall, James. Discussion upon Genus Fenestella, p.5-16; 33 plates illustrating corals and Bryozoans of upper and lower Helderberg groups; Brachiopoda, plates and explanations, pl.34-61.

3 (for 1883) 1884. 61p. O.

Contents: Report of Geologist, p.1-3; Hall, James. Bryozoans of the Hamilton Group, p.5-61.

4 (for 1884) 1885. 47p. illus. 2pl. (lith.) maps. O.

Contents: Report of Geologist, p.1-8; Geological Map of the State, p.4-8; Clarke, J. M. Geological Succession in Ontario County, N. Y., p.9-22; Hall, C. E. Laurentian Magnetic Iron Ore Deposits of Northern New York, p.23-34; Hall, James, Mode of Growth and Relations of the Fenestellidae, p.35-45. 2pl.; wood-cuts of palaeozoic pectenoid shells, p.47.

5 (for 1885) 1886. 47p. illus. 28pl. (lith.) maps. O.

Contents: Report of Geologist, p.3-5; Palaeontology of New York, v.5, pt2, Lamellibranchiata, p.5-7; Beecher, C. E. & Hall, C. E. Field Notes on

the Geology of the Mohawk Valley, p.8-10; Oneonta Sandstone in the Vicinity of Oxford, Chenango County, N. Y., p.11; Bishop, I. P. Salt Wells of Western New York, p.12-47; 14 plates to accompany Palaeontology of New York, v.5, pt2; 14 plates to accompany Palaeontology of New York, v.6.

6 (for 1886) 1887. 70p. 8pl. (lith.) maps. O.

Contents: Report of Geologist, p.3-9; Williams, S. G. Lower Helderberg Rocks of Cayuga Lake, p.10-12; Williams, S. G. Tully Limestone, its Distribution and its Known Fossils p.13-29; Clarke, J. M. Annelid Teeth from Lower Portion of Hamilton Group and from Naples Shales of Ontario County, N. Y., p.30-33. 1pl.; Clarke, J. M. Supposed Mastodon Bones Found at Attica, N. Y., p.34-35; Hall, James. Dictyospongidae in New York, p.36-38; Hall, James. Note on the Discovery of a Skeleton of an Elk in Farmington, Ontario co., p.39; Hall, James. Descriptions of Fenestellidae of the Hamilton Group, p.41-70. 7pl.

7 (for 1887) no separate edition. *see* Mus. rep. 41 for contents.

8 (for 1888) 1889. 150p. illus. O.

Contents: Report of Geologist, p.5-56; Palaeontology of New York v.7, p. 5-23; List of Type Specimens of Devonian Crustacea described in Palaeontology of New York, v.7 in Possession of Museum, p.24-27; Palaeontology of New York v.8, p.27-42; Clarke, J. M. Genera of the Palaeozoic Brachiopoda, p.43-46; List of Microscopic Sections of Brachiopoda, p.46-47; List of Preparations for v.8, p.47-48; List of Plates of Brachiopoda, p.48-49; Schuchert, Charles. List of the Fossils in the Oriskany Sandstone of Maryland, New York and Ontario, p.50-54; Clarke, J. M. Genus Bronteus in the Chemung Rocks, p.57-59; Clarke, J. M. List of Species Constituting the Known Fauna and Flora of the Marcellus Epoch in New York State, p.60-61; Clarke, J. M. Hercynian Question, p.62-91; Bishop, I. P. Locality of Flint Implements in Wyoming County, N. Y., p.92-94; Catalogue of Specimens Representative of the Taconic System, p.95-98; List of Plates, Drawings, Names of Draughtsmen and Lithographers for Palaeontology of New York, v.5, pt1 and 2, v.7 and 8, p.99-103; Record of Locality Numbers, p.104-50.

9 (for 1889) 1890. 72p. O.

Contents: Report of Geologist, p.7-25; Palaeontology of New York, v.8, p.7-16; Geological Map of the State of New York, p.16-25; Hall, James. Fossil Dictyospongidae of the Devonian and Carboniferous Formations, p.25-27; Schuchert, Charles. On Syringothyris, Winchell and its American Species, p.28-37; Schuchert, Charles. List of Species of the American Palaeozoic Orthis, Spirifera, Spiriferina and Syringothyris, p.38-55; Hall, James. New Forms of Dictyospongidae from the Rocks of the Chemung Group, p.56-60; Record of Locality Numbers, p.61-72.

10 (for 1890) 1891. 155p. 7pl. (lith.) O.

Contents: Report of Geologist, p.7-25; Palaeontology of New York v.8, p.7-14; Clarke, J. M. Genera of the Palaeozoic Brachiopoda, p.15-18; Original Drawings for the Palaeontology of New York v.8, p.19; List of Figures for v.8, p.19-21; List of Microscopic Sections of Brachiopoda, p.22-23; Clarke, J. M. Report of Assistant Palaeontologist, p.29-31;

List of Accessions to the Department of Palaeontology, p.32-34; Hall, James. Descriptions of Bryozoa, p.35-57; Clarke, J. M. Genus Acidaspis, p.61-71. 3 pl.; Clarke, J. M. Coronura aspectans, p.79-83. 1 pl.; Clarke, J. M. Terataspis grandis, Hall, p.87-90. 1pl.; Hall, James. Preliminary Notice of Newberria, p.91-99. 2 pl.; Merrill, F. J. H. Quaternary Geology of the Hudson River Valley, p.103-9; Ries, Heinrich. Quaternary Deposits of the Hudson River Valley between Croton and Albany, with Notes on Brick Clays, and the Manufacture of Brick, p.110-55.

11 (for 1891) 1892. 300p. illus. 22pl. (lith.) map. O.

Contents: Report of Geologist, p.7-29; Livonia Salt Shaft, p.10-12; Palaeontology of New York, v.8, p.12-13; List of Preparations of Spirals, Loops and Hinge-plates for v.8, pt2, p.14-15; List of Genera of the Palaeozoic Brachiopoda, p.15-21; Additions to the Palaeontological collections, p.22-28; Clarke, J. M. Catalogue of the Collection of Geological and Palaeontological Specimens donated by the Albany Institute, p.33-53; Clarke, J. M. Report of Assistant Palaeontologist, p.54-55; Clarke, J. M. List of the Original and Illustrated Specimens in the Palaeontological Collections, pt1, Crustacea p.57-121; Record of Localities of Extra Limital Geological and Palaeontological Collections, p.122-23; Clarke, J. M. On Cordania a Proposed New Genus of Trilobites, p.124-27; Publications of Geologist, p.128-31; Hall, James & Clarke, J. M. Introduction to the Study of the Brachiopoda, p.133-300, 22pl.

12 (for 1892) 1893. 142p. O.

Contents: Report of Geologist, p.7-41; Palaeontology of New York, v.8 pt1, p.14-22; Palaeontology of New York, v.8, pt2, p.23-25; Geological Map of the State, p.25-38; Geological Surveys and Maps of Parts of the State of New York, p.38-39; Clarke, J. M. Report of Assistant Palaeontologist, p.43-49; Additions to the Geological and Palaeontological Collections during 1891-92, p.50-53; Clarke, J. M. List of the Original and Illustrated Specimens in the Palaeontological Collections, pt2, Annelida and Cephalopoda p.55-104; Emerson, B. K. Two Boulders of a very Basic Eruptive Rock from the West Shore of Canandaigua Lake, p.105-9; Prosser, C. S. Devonian Section of Central New York along the Unadilla River, p.110-42.

13 (for 1893) 1894. v.1, 597p. illus. 4pl. (lith.) other pl. (phot.) maps. O. v.2, p.598-943. illus. pl.23-54 (lith.) maps. O.

Contents, v.1: Report of Geologist and Palaeontologist, p.7-8; Hall, James. Livonia Salt Shaft, its History and Geological Relations, p.11-20; Luther, D. D. Geology of the Livonia Salt Shaft, p.21-130; Clarke, J. M. Succession of the Fossil Faunas in the Section of the Livonia Salt Shaft, p.131-58; Clarke, J. M. New or Rare Species of Fossils from the Horizons of the Livonia Salt Shaft, p.159-89. 4pl.; Geological Survey of the State of New York, Reports, p.193-557; Darton, N. H. Relations of the Helderberg Limestones and Associated Formations in Eastern New York, p.197-228; Darton, N. H. Geology of Albany County, p.229-61; Nason, F. L. Economic Geology of Albany County, p.263-87; Darton, N. H. Geology of Ulster County, p.289-372; Nason, F. L. Economic Geology of Ulster County, p.373-406; Darton,

N. H. Geology of the Mohawk Valley in Herkimer, Fulton, Montgomery and Saratoga Counties, p.407-29; Kemp, J. F. Geology of Essex County, p.431-72; Cushing, H. P. Geology of Clinton County, p.473-89; Smyth, C. H. jr. Geology of Four Townships in St Lawrence and Jefferson Counties, N. Y., p.491-515; Randall, F. A. Geology of Cattaraugus and Chautauqua Counties, p.517-27; Clarke, J. M. Field Work in Chenango County, p.529-57; Clarke, J. M. *comp.* List of Publications relating to the Geology and Palaeontology of the State of N. Y. 1876-93, p.559-97;

v.2, Dep't of palaeontology: Palaeontology of New York, v.8, pt2, p.603-8; Clarke, J. M. Evolution of the Genera of the Palaeozoic Brachiopoda, p.609-46; Descriptions of New Species figured in v.8, pt2 of Palaeontology of New York, p.647-57; Sherzer, W. H. Platycnemic Man in New York, p.659-83; Simpson, G. B. Genera of Fenestellidae, p.685-727; Simpson, G. B. Glossary and Explanations of Specific Names of Bryozoa and Corals, p.729-47; Hall, James & Clarke, J. M. Introduction to the Study of the Brachiopoda, pt2, p.749-943; pl.23-54.

14 (for 1894) 1895. 669p. illus. 44pl. (lith.) other pl. (phot.) maps. Q.

Contents: Staff of geologist, p.7; Report of Geologist and Palaeontologist, p.9-29; Preface to Palaeontology of New York, v.8, pt2, p.21-28; Geological Survey of the State of New York, Reports, p.31-125; Darton, N. H. Faulted Region of Herkimer, Fulton, Montgomery and Saratoga Counties, p.31-53; Beecher, C. E. & Hall, C. E. Field Notes on the Geology of the Mohawk Valley, with a map, p.54-56; Lincoln, D. F. Geology of Seneca County, p.57-125; Bernard, Felix. Principles of Palaeontology, ed. by J. M. Clarke, p.127-215; Ruedemann, Rudolf. Development and Mode of Growth of Diplograptus, p.217-49. 5 pl.; Girty, G. H. Revision of the Sponges and Coelenterates of the Lower Helderberg Group of New York, p.259-309. 7 pl.; Hall, James & Clarke, J. M. New Species of Brachiopoda described in Palaeontology of New York, v.8, pt1 and 2, p.323-72. 14pl; Simpson, G. B. Handbook of the Genera of the North American Palaeozoic Bryozoa, p.403-669. 30pl.

15 (for 1895) v.1, 1897. v.2, 1898. v.1, 738p. illus. pl. (phot.) maps. F[4]. v.2, p.739-984. illus. 47pl. (lith.) F[4].

Contents: Report of Geologist and Palaeontologist, p.7-26; Geological Survey of the State of New York, Reports, p.27-698; Clarke, J. M. Stratigraphic and Faunal Relations of the Oneonta Sandstones and Shales, the Ithaca and the Portage Groups in Central New York, p.27-81; Prosser, C. S. Classification and Distribution of the Hamilton and Chemung Series of Central and Eastern New York, pt1, p.83-222; Luther, D. D. Stratigraphic Position of the Portage Sandstones in the Naples Valley and the Adjoining Region, p.223-36; Luther, D. D. Economic Geology of Onondaga County, p.237-303; Bishop, I. P. Geology of Erie County, p.305-92; Ries, Heinrich. Geology of Orange County, p.393-475; Smyth, C. H. jr. Crystalline Rocks of St Lawrence County, p.477-97; Cushing, H. P. Geology of Clinton County, p.499-573; Kemp, J. F. Geology of Essex County, p.575-614; Prosser, C. S. & Cumings, E. R. Sections and Thickness of

the Lower Silurian Formations on West Canada Creek and in the Mohawk Valley, p.615-59; Smyth, C. H. jr. Talc Industry of St Lawrence County, p.661-71; Ries, Heinrich. Physical Tests of the Devonian Shales, p.673-98; Ruedemann, Rudolf. Discovery of a Sessile Conularia, p.699-728. 4 pl.; Clarke, J. M. Crustaceans from the Chemung Group, p.729-38.

v.2: Hall, James & Clarke, J. M. Memoir on the Palaeozoic Reticulate Sponges Constituting the Family Dictyospongidae, pt1, p.741-984. 47pl.

16 (for 1896) 1899. 8+448p. illus. 32pl. (lith.) other pl. (phot.) maps. F[4].

Contents: Report of Geologist and Palaeontologist, pref. p.7-8; Geological Survey of the State of New York. Reports, p.1-27, 171-226; Cushing, H. P. Boundary Between the Potsdam and Precambrian Rocks North of the Adirondacks, p.1-27; Clarke, J. M. Naples Fauna in Western N. Y., p.29-161. 9 pl.; Clarke, J. M. Early Stages of Certain Goniatites, p.163-69; Luther, D. D. Brine Springs and Salt Wells of New York and the Geology of the Salt District, p.171-226; Grabau, A. W. Faunas of the Hamilton Group of Eighteen-mile Creek and Vicinity in Western New York, p.227-339; Memoir 2, pt2, Hall, James & Clarke, J. M. Memoir on the Palaeozoic Reticulate Sponges Constituting the Family Dictyospongidae, pt2, p.341-448. pl.48-70.

17 (for 1897) 1899. 564p. illus. pl. (phot.) maps. O.

Contents: Report of Geologist and Palaeontologist, p.5-7; Bishop, I. P. Petroleum and Natural Gas in Western New York, p.9-63; Prosser, C. S. Classification and Distribution of the Hamilton and Chemung Series of Central and Eastern New York, pt2, p.65-315; Eastman, C. R. Upper Devonian Fish Fauna of Delaware County, N. Y., p.317-27; Prosser, C. S. & Rowe, R. B. Stratigraphic Geology of the Eastern Helderbergs, p.329-54; Ries, Heinrich. Limestones of New York, p.355-467; Smyth, C. H. jr. Crystalline Rocks of the Western Adirondack Region, p.469-97; Kemp, J. F. & Newland, D. H. Geology of Washington, Warren and Parts of Essex and Hamilton Counties, p.499-553; Index, p.555-64.

18 (for 1898) 1899. 169p. illus. pl. (phot.) maps. O.

Contents: Report of Acting State Geologist and Paleontologist, p.5-7; Kümmel, H. B. The Newark or New Red Sandstone Rocks of Rockland County, p.9-50; Prosser, C. S. Sections of the Formations along the Northern End of the Helderberg Plateau, p.51-72; Cushing, H. P. Geology of Franklin County, p.73-128; Smyth, C. H. jr & Newland, D. H. Progress in Mapping Crystalline Rocks of Western Adirondack Region, p.129-35; Kemp, J. F., Newland, D. H. & Hill, B. F. Geology of Hamilton, Warren and Washington Counties, p.137-62; Index, p.163-69.

19 (for 1899) 1901. 158p. illus. pl. (phot.) maps. O.

Contents: Report of Geologist, p.r7-16; Kemp, J. F. & Hill, B. F. Precambrian Formations in Parts of Warren, Saratoga, Fulton and Montgomery Counties, p.r17-35; Cushing, H. P. Geology of Rand Hill and

Vicinity, Clinton Co., p.r37-82; Smyth, C. H. jr. Geology of the Crystalline Rocks in the Vicinity of the St Lawrence River, p.r83-104; Bishop, I. P. Oil and Gas in Southwestern New York, p.r105-34; Nevius, J. N. Roofing Slate Quarries of Washington County, p.r135-50; Nevius, J. N. Emery Mines of Westchester County, p.r151-54; Index, p.r155-58.

20 (for 1900) 1902. 189p. illus. pl. (phot.) maps. O.

Contents: Report of Geologist, p.r7-22; Tests of Road Metal, p.r14-22; Cushing, H. P. Recent Geologic Work in Franklin and St Lawrence Counties, p.r23-82; Cushing, H. P. Pre-Cambrian Outlier at Little Falls, Herkimer Co., p.r83-95; Finlay, G. I. Preliminary Report of Field Work in the Town of Minerva, Essex Co., p.r96-102; Fairchild, H. L. Pleistocene Geology of Western New York, Report of Progress for 1900, p.r103-39; Eckel, E. C. The Quarry Industry in Southeastern New York, p.r141-76; Parsons, A. L. Recent Developments in the Gypsum Industry in New York State, p.r177-83; Index, p.r185-89.

Paleontologist's annual reports for 1899-1901. 1900-1902.

See fourth note under Geologist's annual reports.

Bound also with museum reports of which they form a part. Reports for 1899 and 1900 may be had for 20 cents each. Beginning with 1901 these reports will be issued as bulletins.

(for 1899) 1900. p.659-816. O.

Contents: Report of Paleontologist, p.661-78; Accessions, p.679-83; General Record of Localities of American Paleozoic Fossils belonging to State Museum, p.683-813; Index, p.815-16.

(for 1900) 1901. 124p. 4pl. (lith.). O.

Contents: Report of Paleontologist, p.5-25; Accessions, p.25-31; New Entries of Localities of Fossils, p.31-81; Clarke, J. M. Notes on Paleozoic Crustaceans, p.83-119. 4 pl.; Index, p.121-24.

(for 1901) 1902. p.419-693. 9pl. (lith.) O.

Contents: Report of Paleontologist, p.419-56; George Bancroft Simpson, p.457-60; Accessions, p.461-68; New Entries of Localities of Fossils, p.468-516; Clarke, J. M.; Ruedemann, R. & Luther, D. D. Contact Lines of Upper Siluric Formations on the Brockport and Medina Quadrangles, p.517-23; Clarke, J. M. Paleontologic Results of the Areal Survey of the Olean Quadrangle, p.524-28; van Ingen, Gilbert. Potsdam Sandstone of the Lake Champlain Basin, p.529-45; Ruedemann, Rudolf. Graptolite Facies of the Beekmantown Formation in Rensselaer County, N. Y., p.546-75; Ruedemann, Rudolf. Growth and Development of Goniograptus thureaui McCoy, p.576-92; White, David. Fossil Alga from the Chemung of New York, p.593-605; Clarke, J. M. A New Genus of Paleozoic Brachiopods, Eunoa, p.606-15; Luther, D. D. Stratigraphic Value of the Portage Sandstones, p.616-31; Ulrich, E. O. and Schuchert, Charles. Paleozoic Seas and Barriers in Eastern North America, p.633-63; Clarke, J. M. Indigene and Alien Faunas of the New York Devonic, p.664-72; Explanation of Plates, p.673-84; Index, p.685-93.

[a]Botanist's annual reports for 1867-1901. 1869-1902.

Bound also with museum reports 21-55 of which they form a part; the first botanist's report appeared in the 21st museum report and is numbered 21. Reports 21-24, 29, 31-41 were not published separately.

Separate reports 25-28, 30, 42-50 and 52 (Museum bulletin 25) are out of print. Report 51 may be had for 40 cents; 53 for 20 cents; 54 for 50 cents; 55 (Museum bulletin 54) for 40 cents. Beginning with 1901, these reports will be issued as bulletins.

Descriptions and illustrations of edible, poisonous and unwholesome fungi of New York have been published in volumes 1 and 3 of the 48th museum report and in volume 1 of the 49th, 51st, 52d, 54th and 55th reports. The descriptions and illustrations of edible and unwholesome species contained in the 49th, 51st and 52d reports have been revised and rearranged, and combined with others more recently prepared and constitute *Museum memoir 4.*

[b]*Contents:* Order Agaricini, 23, p.66-127; Genus Boletus, 23, p.127-33; Genus Clavaria, 24, p.104-5; Genus Aecidium, 24, p.105-8; Gelatinosporium *gen. nov.*, 25, p.84-106; Synopsis of New York Pucciniae, 25, p.110-23; Report on Fungi, 27, p.74-80; Parasitic Fungi of New York and their Supporting Plants, 29, p.71-82; New York Species of Helvella, 31, p.59-60; New York Species of Phallus, 32, p.37-43; Glomerularia *gen. nov.*, 32, p.43-52; New York Species of Lycoperdon, 32, p.58-72; New York species of Amanita, 33, p.38-49; Report on Fungi, 34, p.24-36; New York Carices, 35, p.147-49; New York Species of Lepiota, 35, p.150-64; New York Species of Psalliota, 36, p.41-49; New York Species of Lactarius, 38, p.111-33; New York Species of Pluteus, 38, p.133-38; New York Species of Pleurotus, Claudopus and Crepidotus, 39, p.58-73; Fungi Destructive to Wood, 41, p.86-94; New York Species of Clitopilus, 42, p.135-42 (*sep. ed.* p.39-46); New York Species of Armillaria, 43, p.86-91 (*sep. ed.* p.40-45); Fungi Destructive to Wood, 43, p.91-93 (*sep. ed.* p.45-47); New York Species of Tricholoma, 44, p.150-76 (*sep. ed.* p.38-64); Fungi of Maryland, 44, p.176-87 (*sep. ed.* p.64-75); New York Species of Omphalia, 45, p.92-102 (*sep. ed.* p.32-42); New York Species of Pluteolus, 46, p.138-41 (*sep. ed.* p.58-61); New York Species of Galera, 46, p.141-49 (*sep. ed.* p.61-69); List of New York Fungi represented at the World's Columbian Exposition at Chicago, 47, p.169-72 (*sep. ed.* p.43-46); Preliminary List of Hymenomycetous Fungi inhabiting our Principal Coniferous Forest Trees, 47, p.172-74 (*sep. ed.* p.46-48); New York Species of Carex, 48, 1:118-202 (*sep. ed.* p.20-104); Edible and Poisonous Fungi of New York, 48, 1:203-316, 44pl. in 48, v.3 (*sep.ed.* p.105-241, 44pl.); New York Species of Collybia, 49, 1:46-69 (*sep. ed.* p.32-55); Edible Fungi, 49, 1:70-78, 5pl. (*sep. ed.* p.56-62); Unwholesome Fungi, 49, 1:79, 1pl. (*sep. ed.* p.65); New York Species of Flammula, 50, 1:133-42; Edible Fungi, 51, 1:300-12, 7pl.; List of Changed Names, 52, 1:628-42; Plants of the Summit of Mt Marcy, 52, 1:657-73; Edible Fungi, 52, 1:673-82, 5pl.; Plants of Bonaparte Swamp, Lewis County, 53, 1:858-61; Edible Fungi, 54, 1:173-86 (1st paging), 8pl.; Edible Fungi, 55, 1:966-82, 5pl.

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[a] Papers entitled *Facts and Observations touching the Flora of the State of New York* were published in Mus. rep. 18, 19 and 20, the last being by C. H. Peck, the present state botanist.

[b] Not including Plants added; Contributors and their contributions; Species not before reported; Remarks and observations, which appear in each report.

Entomologist's annual reports on the injurious and other insects of the State of New York for 1882-1901. 1882-1902.

Reports 3-17 bound also with museum reports 40-46, 48-55 of which they form a part. Beginning with 1898 these reports have been issued as bulletins.

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Bulletins	*Report*	*Bulletins*	*Report*	*Bulletins*	*Report*
12–15	48, v. 1	20–25	52, v. 1	35–36	54, v. 2
16–17	50 "	26–31	53 "	37–44	" v. 3
18–19	51 "	32–34	54 "	45–48	" v. 4

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9 (Z2) Marshall, W. B. Beaks of Unionidae Inhabiting the Vicinity of Albany, N. Y. 24p. 1pl. (lith.) Aug. 1890. *10c.*

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68 (E18) Needham, J. G. *and others.* Aquatic Insects in New York State. *In press.*

69 (P9) Clarke, J. M. Report of the State Paleontologist 1902. *In press.*

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[a]University handbooks. 7½x12½ cm. 1893-1902. In quantities, 1 cent for each 16 pages or less. Single copies postpaid as below.

H5 New York State Museum. 14p. *2c.*

Outlines history and work of the museum; with list of staff and scientific publications, 1893. *New edition in press.*

H13 Paleontology. 8p. *2c.*

Brief outline of State Museum work in paleontology under heads: Definition; Relation to biology; Relation to stratigraphy; History of paleontology in New York.

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[a] Including only those relating to the Museum.

H16 Entomology. 16p. *2c.*

H17 Economic Geology. *In preparation.*

H18 Insecticides and Fungicides. 20p. *3c.*

Maps. Merrill, F. J. H. Economic and Geologic Map of the State of New York; issued as part of Museum bulletin 15 and the 48th museum report, v. 1. 59x67 cm. 1894. Scale 14 miles to 1 inch. *Out of print.*
New edition in preparation.

——— Geologic Map of New York. 1901. Scale 5 miles to 1 inch. *In atlas form $3; mounted on rollers $5. Lower Hudson sheet 60c.*
The lower Hudson sheet, geologically colored, comprises Rockland, Orange, Dutchess, Putnam, Westchester, New York, Richmond, Kings, Queens and Nassau counties, and parts of Sullivan, Ulster and Suffolk counties; also northeastern New Jersey and part of western Connecticut.

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Observations on the Genera Platyostoma and Strophostylus, p.20-22.
Observations on the Genus Nucleospira, p.23-34.
Observations on the Genus Eatonia, p.34-37.
Observations on the Genus Rensselaeria, p.38-41.
Observations on the Genus Camarium, p.42-44.
Notes upon the Genus Graptolithus, p.45-58.
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Supplementary Note on the Genus Ambonychia, p.110.

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On Genus Rhynchonella, p.65-69.
Observations on Orthis, Skenidium, Ambocoelia and Vitulina, p.69-73.
Observations on the Genera Athyris (=Spirigera), Merista (=Camarium), Meristella and Leiorhynchus, p.73-75.
Descriptions of New Species of Fossils from the Hamilton Group of Western New York, with Notices of Others from the Same Horizon in Iowa and Indiana, p.76-94.
Notes and Observations upon the Fossils of the Goniatite Limestone in the Marcellus Shale of the Hamilton Group, in the Eastern and Central Parts of the State of New York, and Those of the Goniatite Beds of Rockford, Ind., with Some Analogous Forms from the Hamilton Group Proper, p.95-112, 125.
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[a] Observations upon Some of the Brachiopoda, with Reference to the Characters of the Genera Cryptonella, Centronella, Meristella, Trematospira, Rhynchospira, Retzia, Leptocoelia and Allied Forms, p.38-61.
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Observations upon Some Spiral-growing Fucoidal Remains of the Palaeozoic Rocks of New York, p.76-83.
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[b] Preliminary Notice of the Fauna of the Potsdam Sandstone, with Remarks upon the Previously Known Species of Fossils and Descriptions of Some New Ones from the Sandstone of the Upper Mississippi Valley, p.119-209.
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Genus Chonetes (Fischer, 1837), p.242-44.
Remarks on the Genera Productus, Strophalosia, Aulosteges and Productella, p.245-50.
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Note on the Genus Eichwaldia, p.274-78.
On the Genus Tropidoleptus, p.279-81.
Note on the Genus Palaeaster, with Descriptions of Some New Species and Observations upon Those Previously Described, p.282-303.

[c] Descriptions of some New Species of Crinoideae and other Fossils from the Lower Silurian Strata, principally of the Age of the Hudson River Group, p.304.
[d] Descriptions of Bryozoa and Corals from the Lower Helderberg Group of New York, p.304.
[e] Descriptions of Bryozoa, etc. from the Upper Helderberg and Hamilton Groups of New York, p.304.

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[a] Also published in Alb. Inst. Trans. 4:125-48.
[b] Also published in Alb. Inst. Trans. 1864. 5:93-195.
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[d] Title given here, but paper was published in Mus. rep. 26, p.93-116.
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For page references, *see* List of publications, p.245-46.

—— Notes and Observations on the Cohoes Mastodon. Mus. rep. 21 (for 1867) 1871. p.99-148. 5pl. 2 maps.
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For contents of reports, *see* List of publications, p.246-52.

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—— Notes on Some New or Imperfectly known Forms among the Brachiopoda, etc. Mus. rep. 23 (for 1869) 1873. p.244-47. pl. 13.
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Also published separately.

—— —— Plates and descriptions. Geol. rep. 6 (for 1886) 1887. p.41-70. 7pl. Mus. rep. 41 (for 1887) 1888. pl.8-15.

—— On the Structure of the Shell in the Genus Orthis. Mus. rep. 36 (for 1882) 1883. p.73-75. pl.3-4.
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—— Illustration of Cryptozoön. Mus. rep. 36 (for 1882) 1883. pl.6.
Also published separately.

—— Discussion upon the Manner of Growth, Variation of Form and Characters of the Genus Fenestella, and its Relations to Hemitrypa, Polypora, Retepora, Cryptopora, etc. Geol. rep. 2 (for 1882) 1883. p.5-16, illus. *continued* Geol. rep. 4 (for 1884) 1885. p.35-45. illus. 2pl.

—— Brachiopoda, plates and explanations. Geol. rep. 2 (for 1882) 1883. pl.34-61.

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Dr Hall was appointed paleontologist by Gov. Bouck in 1843, while his title as geologist originated from the commission of 1837 on the geological survey. For his other reports, *see* Annual Report of the Fourth Geological District 1838-41; final report, 1843, and his reports as curator and director of museum, 1867-93.
Geol. rep. 18, edited by J. M. Clarke, acting state geologist and paleontologist.
For page references and contents *see* List of publications, p.257-61.
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Chart of well sections.

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Geologic map of a part of southeastern New York, 58 x 66cm.

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SUBJECT INDEX

This is mainly an index to geologic, mineralogic and paleontologic publications, including papers in administrative reports of the museum. For index to Entomologist's reports 1-13, *see* Mus. bul. 24. For index to Botanist's reports 22-38, *see* Mus. rep. 41, p.94-122; reports 39-48, *see* Mus. rep. 50, 1:143-59.

Descriptions of rock formations are indexed; also subjects relating to economic geology, names of minerals, names of classes of animals and fossils, ordinal and English names of insects and generic names of plants. A special index to genera and species of fossils follows this.

Geologic formation names are indexed under terms used in the text followed by synonyms in curves, with *See also* references to synonyms and related formations at the end of entries on a subject. The name of the geologist first using the term is indicated by a footnote.

As a rule geographic divisions smaller than counties are not included in the index; there are, however, a few exceptions.

Unless otherwise specified, pl. refers to lithographic plates only.

For other explanatory matter, and list of abbreviations, *see* p.240.

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First report describes reconnaissance of east and west portions of Adirondacks; second report chiefly filled with details of St Lawrence and Essex counties, also many details about iron mines, and an account of his ascent of Mt Marcy; third report describes Hamilton, Clinton and Warren counties; fourth report takes up the iron ores at length, specially those at Lake Henderson; fifth report describes Hamilton, Essex and Franklin counties, and iron ores of Clinton and Franklin.

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a First use of term.

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For dates of reports, *see* List of publications, p.264.

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[a] First use of term.

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See also Calciferous sandrock.

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[a] First use of term.
[b] First use of term in original publication of this article. Science. 1899. new ser 10:877.

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[a] Eaton. Birdseye Marble. Geol. and Agric. Surv. adjoining the Erie Canal. 1824. p.32.

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[a] First use of term.

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Smock. Birdseye Limestone. Mus. bul. 3. 1888. p.21; 10. 1890. p.210-11.

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—— —— Mus. bul. 19. 1898. p.200. *Same*, Mus. rep. 51 (for 1897) 1899. 1:200.

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[a]First use of term.

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[a] First use of term.

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a First use of term.

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[a] First use of term.

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Pt1 Geologic map of parts of Chenango, Madison, Otsego, Schoharie and Albany counties, 58x33.5cm.

Pt2 Map showing distribution of middle and upper Devonian rocks in central eastern New York, 61x38.5cm; Map of Delaware county, by W. L. Fisher, 34x32cm.

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Chemung group (*continued*)

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Clays (*continued*)

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[a]Vanuxem. Clinton Group. Geol. N. Y. pt3. 1842. p.79-90.

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[a] First use of term.

Clinton group (*continued*)

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Coal system, *see* Carboniferous system.

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[a]**Cobleskill limestone.** Clarke. Coralline or Cobleskill Limestone. Mus. mem. 5. p.136-37. *In press.*

Hartnagel. Preliminary Observations on the Cobleskill (Coralline) Limestone of New York. Pal. rep. (for 1902). *In press.*

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[b]Clarke & Schuchert. Coeymans Limestone. Mus. mem. 3. 1900. p.11. *Same,* Mus. rep. 53 (for 1899) 1901. 2:11.

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Map of Cohoes falls and vicinity (uncolored) 67x42cm.

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For dates of reports, *see* List of publications, p.264.

Felt. Species Treated. Ent. rep. 14 (for 1898) 1898. p.158-60 (Mus. bul. 23). *Same,* Mus. rep. 52 (for 1898) 1900. 1: 158-60.

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[a] First use of term in report of paleontologist to secretary of Regents. Regents bulletin 59. 1903. p.r42.

[b] First use of term in original publication of this article. Science. 1899. new ser. 10:877.

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MacGillivray. Aquatic Chrysomelidae and a Table of the Families of Coleopterous Larvae. Mus. bul. 68. *In press.*

Young. List of Coleoptera taken at Newport, Herkimer co., N. Y. Ent. rep. 18 (for 1902). p.153-61. *In press.*

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Agrilus ruficollis. Ent. rep. 6, p.123-25. *Same*, Mus. rep. 43, p.123-25.

—— Ent. rep. 10, p.406-7. *Same*, Mus. rep. 48, 1:406-7 (1st paging).

Anomala lucicola. Ent. rep. 10, p.408-10. *Same*, Mus. rep. 48, 1:408-10 1st paging).

Anthrenus scrophulariae. Mus. rep. 30, p.127-35.

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[a] Term originated by Gebhard.
[b] Term Cornifcrous limerock first used by Eaton. Amer. Jour. of Science. 1839. ser. 1. 36:61-71.

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Geologic maps of parts of Clinton county, 33x22, 10.5x5cm.

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[a] Including Precambrian.

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Map of Archean areas of Highlands (uncolored) 11x18.5cm.

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Currant spanworm (*continued*)

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[a] First use of term.

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See also New York series; Old red sandstone; *also* names of subdivisions; *also* names of classes of fossils, i. e. Brachiopoda, Corals, Crustacea, etc.

Devonian shales, *see* Shales.

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Diabase, *see* Trap.

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See also Trap.

Diluvium, *see* Drift.

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See also Pyroxene.

Diorites, *see* Crystalline rocks; Harrison diorite.

Diptera. Additions to Collection. Ent. rep. 4, p.206-7; 5, p.325; 6, p.188; 7, p.382; 8, p.297; 9, p.462; 10, p.510, 516; 11, p.285; 12, p.361; 13, p.372; 14, p.257; 15, p.606-7; 16, p.1038; 17, p.814; 18, p.171.
For dates of reports, *see* List of publications, p.264.

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Diptera (*continued*)

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The following list of species includes only the more important accounts by Fitch, in Ag. Soc. Trans. 21; by Lintner in Ent. rep. 1-13; by Felt in Ent. rep. 12, 14-18, Ag. Soc. Trans. 59, Forest, Fish and Game Com. reports; by Needham in Mus. bul. 47. For dates of reports and bulletins, *see* p.264.

Cecidomyia destructor. Ag. Soc. Trans. 21. p.819-30 (rep. 7, *sep. ed.* p.133-44).

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Culicidae. Mus. bul. 68. *In press.*

Diplosis pini-rigidae. Forest. Fish and Game Com. rep. 7. *In press.*

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Phora agarici. Ent. rep. 10. p.399-406. *Same*, Mus. rep. 48, 1:399-406 (1st paging).

Phytomyza chrysanthemi. Ent. rep. 4, p.73-80. *Same*, Mus. rep. 41, p.193-200.

—— Ent. rep. 7, p.242-46. *Same*, Mus. rep. 44, p.242-46.

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Sciara coprophila. Ent. rep. 10, p.391-97. *Same*, Mus. rep. 48, 1:391-97 (1st paging).

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Stratiomyia badius. Mus. bul. 47, p.576-77. *Same*, Mus. rep. 54, 4:576-77.

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Hunt. Dolomite. Mus. rep. 21 (for 1867) 1871. p.71-72.

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See also Guelph formation.

Dragon flies, *see* Neuropteroid insects.

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[a] First use of term.

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[a] First use of term.

Franklin county *(continued)*

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[a]First use of term.

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Map of western salt field of New York, 52.5x32.5cm.
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[a] Term first defined by Bell. Described by Logan. Can. Geol. Surv. 1863. p. 298-344.

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Hamilton group (*continued*)

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Pt 1 Geologic map of parts of Chenango, Madison, Otsego, Schoharie and Albany counties, 58x33.5cm.

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Smock. Quarries. Mus. bul. 3. 1888. p.71-85; 10. 1890. p.265-75.

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[a]Vanuxem. Hamilton Group. Geol. rep. 3d dist. (for 1839) 1840. p.380. Geol. N. Y. pt3. 1842. p.150-63.

Vanuxem. Hamilton Group in Broome County. Geol. N. Y. pt3. 1842. p.295.

Vanuxem. Hamilton Group in Cayuga County. Geol. N. Y. pt3. 1842. p.288-89.

Vanuxem. Hamilton Group in Chenango County. Geol. N. Y. pt3. 1842. p.292-93.

Vanuxem. Hamilton Group in Cortland County. Geol. N. Y. pt3. 1842. p.290.

Vanuxem. Hamilton Group in Madison County. Geol. N. Y. pt3. 1842. p.275-77.

Vanuxem. Hamilton Group in Oneida County. Geol. N. Y. pt3. 1842. p.264.

Vanuxem. Hamilton County in Onondaga County. Geol. N. Y. pt3. 1842. p.285.

Vanuxem. Hamilton Group in Otsego County. Geol. N. Y. pt3. 1842. p.254.

Vanuxem. Hamilton Group in Tompkins County. Geol. N. Y. pt3. 1842. p.298.

Vanuxem. Fossils. Geol. N. Y. pt3. 1842. p.151-53, 158-63, 306.

See also Hamilton shales; Marcellus shales; Tully limestone.

Hamilton shales. Bishop. Hamilton Shales of Erie County. Geol. rep. 15 (for 1895) 1897. p.316-20. *Same*, Mus. rep. 49 (for 1895) 1898. 2:316-20.

Clarke. Hamilton Shales of Ontario County. Geol. rep. 4 (for 1884) 1885. p.12-17.

Clarke & Schuchert. Hamilton Beds. *See* New York series.

Darton. Hamilton Flags and Shales; Hamilton Black Shales in Albany County. Geol. rep. 13 (for 1893) 1894. p.240-42. *Same*, Mus. rep. 47 (for 1893) 1894. p.434-36.

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[a] First use of term.

Hamilton shales (*continued*)

Darton. Hamilton Shales of Ulster County. Geol. rep. 13 (for 1893) 1894. p.300-1. *Same*, Mus. rep. 47 (for 1893) 1894. p.494-95.

Emmons. Hamilton Shales. Ag. N. Y. 1846. 1:183-86.

Grabau. Hamilton Shales. Geol. rep. 16 (for 1896) 1899. p.235-36. *Same*, Mus. rep. 50 (for 1896) 1899. 2:235-36.

Lincoln. Hamilton Shales of Seneca County. Geol. rep. 14 (for 1894) 1895. p.93-95. *Same*, Mus. rep. 48 (for 1894) 1895. 2:93-95.

Luther. Hamilton Shales of Onondaga County. Geol. rep. 15 (for 1895) 1897. p.280-82. *Same*, Mus. rep. 49 (for 1895) 1898. 2:280-82.

Luther. Hamilton Shales of the Salt District. Geol. rep. 16 (for 1896) 1899. p.217-19. *Same*, Mus. rep. 50 (for 1896) 1899. 2:217-19.

Merrill. Hamilton Shale. Mus. bul. 19. 1898. p.163. *Same*, Mus. rep. 51 (for 1897) 1899. 1:163.

Ries. Hamilton Shale. Geol. rep. 15 (for 1895) 1897. p.693-94. *Same*, Mus. rep. 49 (for 1895) 1898. 2:693-94.

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Harlem quadrangle. Woodworth. Harlem Quadrangle. Mus. bul. 48. 1901. p.648-50. *Same*, Mus. rep. 54 (for 1900) 1902. 4:648-50.

Harmatome. Beck. Harmatome. Min. N. Y. 1842. p.451.

Harrison diorite. Eckel. Quarries. Geol. rep. 20 (for 1900) 1902. p.r165-66. *Same*, Mus. rep. 54 (for 1900) 1902. 1:r165-66.

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Heavy spar, *see* Barite.

Helderberg division. Denniston. Helderberg Division in Orange County. Ag. Soc. Trans. 22 (for 1862) 1863. p.155.

Emmons. Helderberg Series. Geol. N. Y. pt2. 1842. p.100, 429.

Emmons. Helderberg Division. Ag. N. Y. 1846. 1:153-79.

Hall. Helderberg Series. Geol. N. Y. pt4. 1843. p.18, 117-76.

[a]Mather. Helderberg Limestone Group. Geol. rep. 1st dist. (for 1839) 1840. p.212, 236-46; (for 1840) 1841. p.85-89.

Mather. Helderberg Division. Geol. N. Y. pt1. 1843. p.324-53.

Mather. Fossils. Geol. N. Y. pt1. 1843. p.324, 333, 337-53.

Mather. Economical Applications. Geol. N. Y. pt1. 1843. p.326-30.

Vanuxem. Helderberg Division. Geol. N. Y. pt3. 1842. p.15-16, 94-146.

Helderberg limestones (Coeymans; Becraft; Scutella; Lower Helderberg; Lower Pentamerus).

Clarke. Hercynian Question. Geol. rep. 8 (for 1888) 1889. p.62-91. *Same*, Mus. rep. 42 (for 1888) 1889. p.408-37.

Clarke. Devonic Age of the Helderbergian Fauna and the Base of the Devonic System in New York. Mus. mem. 3. 1900. p.82-98. *Same*, Mus. rep. 53 (for 1899) 1901. 2:82-98.

Clarke. Helderbergian Fauna. Mus. bul. 52. 1902. p.665-66.

[a]Conrad. Helderberg Limestones. Pal. rep. (for 1838) 1839. p.62.

Darton. Report on the Relations of the Helderberg Limestones and Associated Formations in Eastern New York. Geol. rep. 13 (for 1893) 1894. p.197-228. pl. (phot.) *Same*, Mus. rep. 47 (for 1893) 1894. p.391-422. pl. (phot.)

Merrill. Helderberg Rocks. Mus. bul. 19. 1898. p.156-57. *Same*, Mus. rep. 51 (for 1897) 1899. 1:156-57.

[a] First use of term.

Helderberg limestones (*continued*)

Ries. Helderberg Limestones. Geol. rep. 17 (for 1897) 1899. p.364-70. *Same*, Mus. rep. 51 (for 1897) 1899. 2:364-70.

Ries. Lower Helderberg Limestones. Mus. bul. 44. 1901. p.759-64. *Same*, Mus. rep. 54 (for 1900) 1902. 3:759-64.

Ries. Helderberg Limestone of Albany County. Geol. rep. 17 (for 1897) 1899. p.429-31. *Same*, Mus. rep. 51 (for 1897) 1899. 2:429-31.

Ries. Lower Helderberg Limestone of Albany County. Mus. bul. 44. 1901. p.770-72. *Same*, Mus. rep. 54 (for 1900) 1902. 3:770-72.

Ries. Lower Helderberg Limestone of Cayuga County. Mus. bul. 44. 1901. p.773-74. *Same*, Mus. rep. 54 (for 1900) 1902. 3:773-74.

Ries. Helderberg Limestone of Genesee County. Mus. bul. 44. 1901. p.783-85. *Same*, Mus. rep. 54 (for 1900) 1902. 3:783-85.

Ries. Lower Helderberg Limestone of Greene County. Mus. bul. 44. 1901. p.786. *Same*, Mus. rep. 54 (for 1900) 1902. 3:786.

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Ries. Helderberg Limestones of Livingston County. Mus. bul. 44. 1901. p.792. *Same*, Mus. rep. 54 (for 1900) 1902. 3:792.

Ries. Lower Helderberg Limestone of Madison County. Mus. bul. 44. 1901. p.793. *Same*, Mus. rep. 54 (for 1900) 1902. 3:793.

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Ries. Lower Helderberg Limestone of Onondaga County. Mus. bul. 44. 1901. p.803-6. *Same*, Mus. rep. 54 (for 1900) 1902. 3:803-6.

Ries. Lower Helderberg Limestones of Ontario County. Mus. bul. 44. 1901. p.807-8. *Same*, Mus. rep. 54 (for 1900) 1902. 3:807-8.

Ries. Helderberg Limestones of Orange County. Geol. rep. 15 (for 1895) 1897. p.401-2. *Same*, Mus. rep. 49 (for 1895) 1898. 2:401-2.

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Ries. Helderberg Limestones of Schoharie County. Mus. bul. 44. 1901. p.816. *Same*, Mus. rep. 54 (for 1900) 1902. 3:816.

See also Becraft limestone; Coeymans limestone; Helderberg division; Lower Helderberg group; Scutella limestone.

Helderberg sandstones. [a]Conrad. Helderberg Sandstones. Pal. rep. (for 1838) 1839. p.62.

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Prosser. Sections of the Formations along the Northern End of the Helderberg Plateau. Geol. rep. 18 (for 1898) 1899. p.51-72. pl. (phot.) *Same*, Mus. rep. 52 (for 1898) 1900. 2:51-72. pl. (phot.)

[a]First use of term.

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Hematite. Beck. Specular Iron Ore. Min. rep. (for 1836) 1837. p.28-32 (ed. 2, p.30-34); (for 1838) 1839. p.46. Min. N. Y. 1842. p. 23-26, 385-86.

Conrad. Red Oxide of Iron and Associated Strata. Geol. rep. 3d dist. (for 1836) 1837. p.176-77 (ed. 2, p.178-79).

Emmons. Specular Oxide of Iron. Geol. rep. 2d dist. (for 1837) 1838. p.206-8. Geol. N. Y. pt2. 1842. p.92-98.

Emmons. Hematitic Iron, or Limonite. Geol. N. Y. pt2. 1842. p.161-62.

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Emmons. Specular Oxide of Iron in Jefferson County. Geol. N. Y. pt2. 1842. p.376-77.

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Merrill. Localities in New York. Mus. bul. 15. 1895. p.543. *Same*, Mus. rep. 48 (for 1894) 1895. 1:543 (2d paging).

Salisbury. Analysis of a Specimen of Hematitic Iron Ore. Mus. rep. 4 (for 1850) 1851. p.111.

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See also Clinton ores; Iron ores.

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For dates of reports, *see* List of publications, p.264.

Fitch. Catalogue with References and Descriptions of the Insects collected and arranged for the State Cabinet of Natural History. Mus. rep. 4 (for 1850) 1851. p.43-69.
On the Homoptera. Reprinted in Ent. rep. 9 and Mus. rep. 46, p. 381-409.

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—— —— Ent. rep. 4 (for 1887) 1888. p.107-21, 156-58. *Same*, Mus. rep. 41 (for 1887) 1888. p.227-41, 276-78.

—— —— Ent. rep. 5 (for 1888) 1889. p.242-57. *Same*, Mus. rep. 42 (for 1888) 1889. p.242-57.

—— —— Ent. rep. 6 (for 1889) 1890. p.137-48. *Same*, Mus. rep. 43 (for 1889) 1890. p.137-48.

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—— —— Ent. rep. 8 (for 1891) 1893. p.152-55. *Same*, Mus. rep. 45 (for 1891) 1892. p.152-55.

Hemiptera (*continued*)

—— —— Ent. rep. 9 (for 1892) 1893. p.315-29. *Same*, Mus. rep. 46 (for 1892) 1893. p.315-29.

—— —— Ent. rep. 10 (for 1894) 1895. p.420-39. *Same*, Mus. rep. 48 (for 1894) 1895. 1:420-39 (1st paging).

—— —— Ent. rep. 11 (for 1895) 1896. p.198-233. *Same*, Mus. rep. 49 (for 1895) 1897. 1:198-233.

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—— —— Ent. rep. 13 (for 1897) 1898. p.351-57. *Same*, Mus. rep. 51 (for 1897) 1899. 1:351-57.

Say. Heteropterus Hemiptera. Ag. Soc. Trans. 17 (for 1857) 1858. p.754-812.

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The following list of species includes only the more important accounts by Lintner in Ent. rep. 1-13; by Felt in Ag. Soc. Trans. 59, Forest, Fish and Game Com. reports.

Acanthia lectularia. Ag. Soc. Trans. 59, p.299-300.

Blissus leucopterus. Ent. rep. 2, p.148-64.

Chermes pinicorticis. Forest, Fish and Game Com. rep. 7. *In press.*

Cicada septendecim. Ent. rep. 12, p.272-89. *Same*, Mus. rep. 50, 1:272-89 (1st paging).

Lygus pratensis. Ent. rep. 13, p.351-57. *Same*, Mus. rep. 51, 1:351-57.

Poecilocapsus lineatus. Ent. rep. 1, p.271-81.

Psylla pyricola. Ent. rep. 9, p.317-29. *Same*, Mus. rep. 46, p.317-29.

Hemiptera. *Scale insects.* Felt. Experiments on Scale Insects. Ent. rep. 16 (for 1900) 1901. p.967-88 (Mus. bul. 36). *Same*, Mus. rep. 54 (for 1900) 1902. 2:967-88.

—— —— Ent. rep. 17 (for 1901) 1902. p.761-75. (Mus. bul. 53).

—— —— Ent. rep. 18 (for 1902). p.126-43. *In press.*

Felt. Scale Insects of Importance and a List of the Species in New York. Mus. bul. 46. 1901. p.289-377. 7pl. (lith.) 5pl. phot. *Same*, Mus. rep. 54 (for 1900) 1902. 4:289-377. 7pl. (lith.) 5pl. (phot.)

Lintner. Species Treated. Ent. rep. 4 (for 1887) 1888. p.114-20. *Same*, Mus. rep. 41 (for 1887) 1888. p.234-40.

—— Ent. rep. 6 (for 1889) 1890. p.141-47. *Same*, Mus. rep. 43 (for 1889) 1890. p.141-47.

—— Ent. rep. 11 (for 1895) 1896. p.200-33. *Same*, Mus. rep. 49 (for 1895) 1897. 1:200-33.

—— Ent. rep. 12 (for 1896) 1897. p.292-98. *Same*, Mus. rep. 50 (for 1896) 1898. 1:292-98 (1st paging).

Species

The following list of species includes only the more important accounts by Lintner in Ent. rep. 1-13, Mus. bul. 13; by Felt in Ent. rep. 14-18, Ag. Soc. Trans. 59, Forest, Fish and Game Com. reports, Mus. bul. 20, 27, 46.

Aspidiotus ancylus. Putnam's scale insect. Mus. bul. 46, p.326-30. *Same*, Mus. rep. 54, 4:326-30.

Aspidiotus forbesi. Cherry scale insect. Mus. bul. 46, p.330-32. *Same*, Mus. rep. 54, 4:330-32.

Aspidiotus hederae. Ivy scale insect. Ent. rep. 11, p.203-4. *Same*, Mus. rep. 49, 1:203-4.

—— Mus. bul. 46, p.333-36. *Same*, Mus. rep. 54, 4:333-36.

Aspidiotus ostreaeformis. European fruit tree scale insect. Mus. bul. 46, p.323-26. *Same*, Mus. rep.54, 4:323-26.

Aspidiotus perniciosus. San José scale insect. Ent. rep. 11, p.200-33. *Same*, Mus. rep. 49, 1:200-33.

Hemiptera. *Scale insects (continued)*

—— Mus. bul. 13, p.263-305. *Same*, Mus. rep. 48, 1:263-305 (2d paging).

—— Ent. rep. 16, p.967-88. *Same*, Mus. rep. 54, 2:967-88.

—— Mus. bul. 46, p.304-23, 336-42. *Same*, Mus. rep. 54, 4:304-23, 336-42.

—— Ent. rep. 17, p.761-75. (Mus. bul. 53).

—— Ent. rep. 18, p.126-43. *In press.*

Chionaspis furfura. Scurfy bark louse. Mus. bul. 46, p.300-4. *Same*, Mus. rep. 54, 4:300-4.

Chionaspis pinifoliae. Pine leaf scale insect. Forest, Fish and Game Com. rep. 7. *In press.*

Gossyparia ulmi. Elm tree bark louse. Ent. rep. 12, p.292-98. *Same*, Mus. rep. 50, 1:292-98.

—— Mus. bul. 20, p.16-18. *Same*, Mus. rep. 52, 1:16-18.

—— Mus. bul. 27, p.46. *Same*, Mus. rep. 53, 1:46.

—— Forest, Fish and Game Com. rep. 5, p.375-79.

Lecanium tulipiferae. Tulip tree scale insect. Ent. rep. 14, p.213-16. (Mus. bul. 23). *Same*, Mus. rep. 52, 1:213-16.

Mytilaspis pomorum. Appletree bark louse. Ent. rep. 4, p.114-20. *Same*, Mus. rep. 41, p.234-40.

—— Mus. bul. 46, p.297-300. *Same*, Mus. rep. 54, 4:297-300.

Pulvinaria innumerabilis. Cottony maple tree insect. Ent. rep. 6, p.141-47. *Same*, Mus. rep. 43, p.141-47.

—— Mus. bul. 27, p.52. *Same*, Mus. rep. 53, 1:52.

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Hempstead quadrangle. Woodworth. Hempstead Quadrangle. Mus. bul. 48. 1901. p.618. *Same*, Mus. rep. 54 (for 1900) 1902. 4:618.

Hepatic springs, *see* Sulfur springs.

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See also Helderberg limestones.

Herkimer county. Beck. Mineralogy. Min. rep. (for 1839) 1840. p.69-70.

Cushing. Pre-Cambrian Outlier at Little Falls. Geol. rep. 20 (for 1900) 1902. p.r83-95. *Same*, Mus. rep. 54 (for 1900) 1902. 1:r83-95.

Darton. Geology of the Mohawk Valley in Herkimer, Fulton, Montgomery and Saratoga Counties. Geol. rep. 13 (for 1893) 1894. p.407-29. pl. (phot.) *Same*, Mus. rep. 47. (for 1893) 1894. p.601-23. pl. (phot.)

Darton. Faulted Region. Geol. rep. 14 (for 1894) 1895. p.11-12, 31-53. pl. (phot.) map. *Same*, Mus. rep. 48 (for 1894) 1895. 2:11-12, 31-53. pl. (phot.) map.
Preliminary geologic map of portions of Herkimer, Fulton, Montgomery, Saratoga and adjacent counties (uncolored) 28.5x16.5cm.

Felt. Entomological Reports from. Ent. rep. 15 (for 1899) 1900. p.561. (Mus. bul. 31). *Same*, Mus. rep. 53 (for 1899) 1901. 1:561.

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—— —— Ent. rep. 18 (for 1902). p.148-49. *In press.*

Ries. Brick Yards. Mus. bul. 12. 1895. p.197, 198, 246. *Same*, Mus. rep. 48 (for 1894) 1895. 1:197, 198, 246 (2d paging).

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Ries. Limestones. Geol. rep. 17 (for 1897) 1899. p.437-39. *Same*, Mus. rep. 51 (for 1897) 1899. 2:437-39.

—— —— *revised.* Mus. bul. 44. 1901. p.787-89. *Same*, Mus. rep. 54 (for 1900) 1902. 3:787-89.

Herkimer county *(continued)*

Smock. Building Stone Quarries. Mus. bul. 3. 1888. p.32, 71, 112-13; 10. 1890. p.232, 246, 250, 273.

—— —— *revised* by Merrill. Mus. bul. 15. 1895. p.378, 395-96, 439, 443. *Same*, Mus. rep. 48 (for 1894) 1895. 1:378, 395-96, 439, 443 (2d paging).

Vanuxem. Herkimer County. Geol. rep. 3d dist. (for 1837) 1838. p.266-73. Geol. N. Y. pt3. 1842. p.255-59.

White. Report on the Relations of the Ordovician and Eo-Silurian Rocks in Portions of Herkimer, Oneida and Lewis Counties. Mus. rep. 51 (for 1897) 1899. 1:r21-54. pl. (phot.) 2 maps.
Map of the vicinity of Frankfort hill, 31.5x16.5cm.
Map of the Precambrian border in Oneida and Lewis counties, 49.5x16cm.

Young. List of Coleoptera taken at Newport, Herkimer co., N. Y. Ent. rep. 18 (for 1902). p.153-61. *In press.*

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Fitch. Hessian Fly. Ag. Soc. Trans. 21 (for 1861) 1862. p.819-30 (rep.7. sep. ed. p.133-44).

Heulandite. Beck. Heulandite. Min. N. Y. 1842. p.346-47. Mus. rep. 3, *rev. ed.* (for 1849) 1850. p.140-41.

Whitlock. Heulandite. Mus. bul. 58. 1902. p.109.

Hickory borer. Lintner. Painted Hickory Borer. Ent. rep. 8 (for 1891) 1893. p.175-76. *Same*, Mus. rep. 45 (for 1891) 1892. p.175-76.

Highlandite. Mather. Highlandite, Allanite. Geol. N. Y. pt1. 1843. p.512.

Highlands of Hudson. Mather. Altered Taconic Rocks. Geol. N. Y. pt1. 1843. p.446-50.

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Mather. Miscellaneous Remarks. Geol. N. Y. pt1. 1843. p.542-58.

Mather. Magnetic Oxide of Iron. Geol. N. Y. pt1. 1843. p.559-75.

Smock. Geological Reconnaissance in the Crystalline Rock Region: Dutchess, Putnam and Westchester Counties, New York. Mus. rep. 39 (for 1885) 1886. p.165-85. map.
Map of Archaean areas of Highlands (uncolored) 11x18.5cm.

Smock. Magnetic Iron Ores. Mus. bul. 7. 1889. p.5-7, 15-24.

—— —— *revised* by Merrill. Mus. bul. 15. 1895. p.530-32. *Same*, Mus. rep. 48 (for 1894) 1895. 1:530-32 (2d paging).

—— —— *revised* by Merrill. Mus. bul. 19. 1898. p.216-18. *Same*, Mus. rep. 51 (for 1897) 1899. 1:216-18.

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[a] First use of term.

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Vanuxem. Ithaca Group in Otsego County. Geol. N. Y. pt3. 1842. p.254.

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[a] First use of term.

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Heliothis armiger. Ent. rep. 1, p.116-26.

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Hydroecia nitela. Ent. rep. 1, p.110-16.

Hyphantria cunea. Forest, Fish and Game Com. rep. 5, p.363-68.

Hypocala hilli. Mus. rep. 30, p.217-19.

Leucania unipuncta. Ent. rep. 12, p.190-214. *Same*, Mus. rep. 50, 1:190-214 (1st paging).

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Mamestra picta. Ent. rep. 5, p.206-10. *Same*, Mus. rep. 42, p.206-10.

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Melitaea nycteis. Mus. rep. 23, p.158-59.

Melitaea phaeton. Mus. rep. 23, p.154-57.

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Nisoniades icelus. Mus. rep. 23, p.162-64.

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Ries. Limestones of New York and their Economic Value. Geol. rep. 17 (for 1897) 1899. p.355-467. *Same*, Mus. rep. 51 (for 1897) 1899. 2:355-467.

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Map of New York State showing location of limestone quarries and marl deposits and manufactories of natural and Portland cement (uncolored) 72x74cm.

Map of New York State showing distribution of limestone (uncolored) 44.5x35cm.

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Hall. Bog Iron Ore. Geol. rep. 4th dist. (for 1838) 1839. p.335.

Hall. Bog Ore of Niagara County. Geol. rep. 4th dist. (for 1837) 1838. p.367. Geol. N. Y. pt4. 1843. p.447.

Hall. Bog Iron of Orleans County. Geol. rep. 4th dist. (for 1837) 1838. p.355. Geol. N. Y. pt4. 1843. p.437-38.

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Mather. Limonite in Putnam and Westchester Counties. Geol. rep. 1st dist. (for 1838) 1839. p.107-8.

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Map showing area of New York covered by Onondaga salt group, 37x14.5cm.

Map showing salt-producing district of western New York, 34.5x21.5cm (in Geol. rep. only).

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[a] First use of term.

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[a]First use of term.

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Map of the vicinity of Frankfort hill, 31.5x16.5cm.
Map of the Precambrian border in Oneida and Lewis counties, 49.5x16cm.

See also Champlainic; *also names of subdivisions; also names of classes of fossils*, i. e. Brachiopoda, Cephalopoda, etc.

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[a] First use of term in original publication of this article. Science. 1899. new ser. 10:877.

[b] First use of term.

Madison county (*continued*)

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[a]First use of term.

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Clarke. List of the Species constituting the known Fauna and Flora of the Marcellus Epoch in the State of New York. Geol. rep. 8 (for 1888) 1889. p.60-61. *Same*, Mus. rep. 42 (for 1888) 1889. p.406-7.

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Marcellus shales *(continued)*

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Beck. Tabular View of the Minerals of the State of New York. Min. rep. (for 1838) 1839. p.10-13.

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Mineralogy (*continued*)

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Emmons. Minerals of Essex County. Geol. N. Y. pt2. 1842. p.285-87.

Emmons. Minerals of St Lawrence County. Geol. N. Y. pt2. 1842. p. 365-66.

Emmons. Minerals of Warren County. Geol. N. Y. pt2. 1842. p.192.

Emmons. Composition of Simple Minerals. Ag. N. Y. 1846. 1:39-42.

Hunt. On the Mineralogy of the Laurentian Limestones of North America. Mus. rep. 21 (for 1867) 1871. p.47-98.

Mather. Useful Minerals of Catskill Division. Geol. N. Y. pt1. 1843. p.314-16.

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Economic and geologic map of New York State, 23x35cm.
Geologic map of a part of southeastern New York, 58x66cm.

Merrill. Minerals. Mus. bul. 19. 1898. p.120-22. *Same*, Mus. rep. 51 (for 1897) 1899. 1:120-22.

Nason. Some New York Minerals and their Localities. Mus. bul. 4. 1888. 19p. 1 pl. (phot.)

Newton. Catalogue of the Minerals of Washington County. Ag. Soc. Trans. 9 (for 1849) 1850. p.857-62.

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Pt 2 Description of mineral species.

See also names of minerals.

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See also Iron.

Mispickel, *see* Arsenopyrite.

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Mather. Mohawk Limestone. Geol. rep. 1st dist. (for 1840) 1841. p.91, 98-101. Geol. N. Y. pt1. 1843. p.402-6.

Vanuxem. Mohawk Limestone. Geol. rep. 3d dist. (for 1839) 1840. p.363-64, 370.

See also Mohawkian.

Mohawk river. Nason. Power at Cohoes. Geol. rep. 13 (for 1893) 1894. p.282-83, 287. *Same*, Mus. rep. 47 (for 1893) 1894. p.476-77, 481.

Mohawk river valley. Beck. Valley of the Mohawk and Western New York; Mineralogy. Min. rep. (for 1840) 1841. p.8-11.

*a*First use of term.

Mohawk river valley (*continued*)

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Map showing results of field work in Mohawk valley, 25x20.5cm.

Darton. Geology of the Mohawk Valley in Herkimer, Fulton, Montgomery and Saratoga Counties. Geol. rep. 13 (for 1893) 1894. p.407-29. pl. (phot.) *Same*, Mus. rep. 47 (for 1893) 1894. p.601-23. pl. (phot.)

Darton. Faulted Region of Herkimer, Fulton, Montgomery and Saratoga Counties. Geol. rep. 14 (for 1894) 1895. p.11-12, 31-53. pl. (phot.) map. *Same*, Mus. rep. 48 (for 1894) 1895. 2:11-12, 31-53. pl. (phot.) map.
Preliminary geologic map of portions of Herkimer, Fulton, Montgomery, Saratoga and adjacent counties (uncolored) 28.5x16.5cm.

Emmons. Climate. Ag. N. Y. 1846. 1:23-26.

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Prosser. Notes on the Stratigraphy of the Mohawk Valley and Saratoga County. Mus. bul. 34. 1900. p.469-82. 6pl. (phot.) map. *Same*, Mus. rep. 54 (for 1900) 1902. 1:469-82. 6pl. (phot.) map.
Geologic map of Amsterdam quadrangle, 44x32.5cm.

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See also Utica shale.

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Nason. Molding Sands of Albany County. Geol. rep. 13 (for 1893) 1894. p.274-77, 286. *Same*, Mus. rep. 47 (for 1893) 1894. p.468-71, 480.

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For dates of Mus. rep. *see* List of publications, p.241.

Catalogue of Shells given by Chester Dewey. Mus. rep. 9 (for 1855) 1856. p.31-38.

Catalogue of Shells presented by William Newcomb. Mus. rep. 11 (for 1857) 1858. p.37-42.

Catalogue of Shells from J. G. Anthony. Mus. rep. 15 (for 1861) 1862. p.15-21.

Catalogue of Shells contributed from the Duplicates collected by the Exploring Expedition, Smithsonian Institution. Mus. rep. 15 (for 1861) 1862. p.23-25.

Catalogue of Shells presented to the State Museum by the Smithsonian Institution in 1865 and 1866. Mus. rep. 20 (for 1866) 1867. p.19-54.

Mollusca (*continued*)

Catalogue of European Shells, presented to the State Museum by the Smithsonian Institution in 1869. Mus. rep. 25 (for 1871) 1873. p.39-55.

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List of British Mollusca purchased of P. P. Carpenter. Mus. rep. 12 (for 1858) 1859. p.102-5.

List of Gould Types of Mollusca in State Museum Collection. Mus. rep. 27 (for 1873) 1875. p.47-55.

List of Land and Fresh-water Shells presented to State Museum by T. H. Aldrich. Mus. rep. 27 (for 1873) 1875. p.43-46.

List of Shells from H. Cuming. Mus. rep. 12 (for 1858) 1859. p.105-7.

List of Long Island Mollusca presented to the State Museum. Mus. rep. 25 (for 1871) 1873. p.35-38.

List of Shells presented to the State Museum by Dr James Lewis, Mar. 15, 1875. Mus. rep. 35 (for 1881) 1884. p.112-17.

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Marshall. Land and Fresh-water Shells of New York exhibited at the World's Columbian Exposition, Chicago, Ill., 1893. Mus. rep. 47 (for 1893) 1894. p.49-75.

Marshall. List of Shells inhabiting the Vicinity of Albany and Troy, N. Y. Mus. rep. 48 (for 1894) 1895. 1:641-47.

See also Brachiopoda; Cephalopoda; Gastropoda; Lamellibranchiata; Pteropoda; Unionidae.

Mollusca (paleozoic), *see* Brachiopoda; Cephalopoda; Gastropoda; Lamellibranchiata; Pteropoda.

Molluscoidea, *see* Bryozoa.

Molybdenite. Beck. Sulphuret of Molybdenum. Min. rep. (for 1836) 1837. p.59 (ed. 2, p.61). Min. N. Y. 1842. p.438-39.

Hunt. Sulphuret of Molybdenum. Mus. rep. 21 (for 1867) 1871. p.91.

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Whitlock. Monazite. Mus. bul. 58. 1902. p.117.

Monroe county. Beck. Mineralogy. Min. rep. (for 1839) 1840. p.76-77.

Bishop. Natural Gas. Geol. rep. 17 (for 1897) 1899. p.28. *Same*, Mus. rep. 51 (for 1897) 1899. 2:28.

Felt. Entomological Reports from. Ent. rep. 15 (for 1899) 1900. p.563-64. (Mus. bul. 31). *Same*, Mus. rep. 53 (for 1899) 1901. 1:563-64.

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Hall. Monroe County. Geol. rep. 4th dist. (for 1837) 1838. p.327-47. Geol. N. Y. pt4. 1843. p.422-33.

Monroe county (*continued*)

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—— —— *revised*. Mus. bul. 35. 1900. p.720-22. *Same*, Mus. rep. 54 (for 1900) 1902. 2:720-22.

Ries. Limestones. Geol. rep. 17 (for 1897) 1899. p.441-42. *Same*, Mus. rep. 51 (for 1897) 1899. 2:441-42.

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Smock. Building Stone Quarries. Mus. bul. 3. 1888. p.59, 133; 10. 1890. p.253, 254, 261-62.

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Monroe shales. Ries. Monroe Shales of Orange County. Geol. rep. 15 (for 1895) 1897. p.404. *Same*, Mus. rep. 49 (for 1895) 1898. 2:404.

Montgomery county. Beck. Mineralogy. Min. rep. (for 1839) 1840. p.77.

Cumings. Lower Silurian System of Eastern Montgomery County. Mus. bul. 34. 1900. p.415-68. 4pl. (phot.) map. *Same*, Mus. rep. 54 (for 1900) 1902. 1:415-68. 4pl. (phot.) map.
Geologic map of Amsterdam quadrangle, 44x32.5cm.

Darton. Geology of the Mohawk Valley in Herkimer, Fulton, Montgomery and Saratoga Counties. Geol. rep. 13 (for 1893) 1894. p.407-29. pl. (phot.) *Same*, Mus. rep. 47 (for 1893) 1894. p.601-23. pl. (phot.)

Darton. Faulted Region. Geol. rep. 14 (for 1894) 1895. p.11-12, 31-53. pl. (phot.) map. *Same*, Mus. rep. 48 (for 1894) 1895. 2:11-12. 31-53. pl. (phot.) map.
Preliminary geologic map of portions of Herkimer, Fulton, Montgomery, Saratoga and adjacent counties (uncolored) 28.5x16.5cm.

Felt. Entomological Reports from. Ent. rep. 16 (for 1900) 1901. p.1014. (Mus. bul. 36). *Same*, Mus. rep. 54 (for 1900) 1902. 2:1014.

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Kemp & Hill. Precambrian Formations. Geol. rep. 19 (for 1899) 1901. p.r17-35. pl. (phot.) maps. *Same*, Mus. rep. 53 (for 1899) 1901. 1:r17-35. pl. (phot.) maps.
Small, uncolored geologic maps.
Map of the "Noses" (colored).

Ries. Brick Yards. Mus. bul. 12. 1895. p.197, 198, 246. *Same*, Mus. rep. 48 (for 1894) 1895. 1:197, 198, 246 (2d paging).

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Ries. Limestones. Geol. rep. 17 (for 1897) 1899. p.442-44. *Same*, Mus. rep. 51 (for 1897) 1899. 2:442-44.

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Vanuxem. Montgomery County. Geol. rep. 3d dist. (for 1837) 1838. p.257-66. Geol. N. Y. pt3. 1842. p.249-53.

Montrose sandstone (Oneonta; Portage). *a*Vanuxem. Montrose Sandstone, or Sandstone of Oneonta. Geol. rep. 3d dist. (for 1839) 1840. p.381.

See also Oneonta sandstone; Portage sandstone.

Mooers quadrangle. Cushing. Geology of Rand Hill and Vicinity, Clinton County. Geol. rep. 19 (for 1899) 1901. p.r37-82. 2 maps. *Same*, Mus. rep. 53 (for 1899) 1901. 1:r37-82. 2 maps.
Geologic maps of parts of Clinton county, 33x22, 10.5x5cm.

a First use of term.

Mortar. Ries. Mortar. Geol. rep. 17 (for 1897) 1899. p.386. *Same*, Mus. rep. 51 (for 1897) 1899. 2:386.

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Moscow shale. Bishop. Moscow Shale of Erie County. Geol. rep. 15 (for 1895) 1897. p.320. *Same*, Mus. rep. 49 (for 1895) 1898. 2:320.

Conrad. Moscow shales. Pal. rep. (for 1839) 1840. p.206.

Delafield. Moscow Shale of Seneca County. Ag. Soc. Trans. 10 (for 1850) 1851. p.455.

Emmons. Moscow Shales. Ag. N. Y. 1846. 1:188.

Grabau. Moscow Shales. Geol. rep. 16 (for 1896) 1899. p.234-35. *Same*, Mus. rep. 50 (for 1896) 1899. 2:234-35.

[a]Hall. Moscow Shales. Geol. rep. 4th dist. (for 1838) 1839. p.298-300. Geol. N. Y. pt4. 1843. p.187.

Hall. Moscow Shale in Erie County. Geol. rep. 4th dist. (for 1840) 1841. p.163-64. Geol. N. Y. pt4. 1843. p.473.

Hall. Moscow Shale of Genesee County. Geol. rep. 4th dist. (for 1839) 1840. p.430. Geol. N. Y. pt4. 1843. p.467.

Hall. Moscow Shale in Livingston County. Geol. rep. 4th dist. (for 1839) 1840. p.421. Geol. N. Y. pt4. 1843. p.462.

Hall. Moscow Shale of Yates County. Geol. rep. 4th dist. (for 1838) 1839. p.316-17.

Luther. Moscow Shales in Livonia Salt Shaft. Geol. rep. 13 (for 1893) 1894. p.42. *Same*, Mus. rep. 47 (for 1893) 1894. p.236.

Wright. Moscow Shale in Yates County. Mus. rep. 35 (for 1881) 1884. p.203-4.

Vanuxem. Moscow Shales. Geol. rep. 3d dist. (for 1839) 1840. p.380.

See also Erie division; Hamilton group.

Mosquito. Lintner. The Mosquito. Ent. rep. 12 (for 1896) 1897. p.319-35. *Same*, Mus. rep. 50 (for 1896) 1898. 1:319-35.

Mosses. Peck. Catalogue of Mosses presented to the State of New York by C. H. Peck. Mus. rep. 18 (for 1864) 1865. p.193-96.

Peck. List of Mosses of the State of New York. Mus. rep. 19 (for 1865) 1866. p.42-70.

Peck. The Mosses of Caledonia Creek. Mus. rep. 32 (for 1878) 1879. p.73-74.

Moths, *see* Lepidoptera.

Mound builders, *see* Aborigines.

Mounds. Vanuxem. Mounds. Geol. N. Y. pt3. 1842. p.247-48.

Mt Marcy, *see* Adirondacks.

Mt Seward. Colvin. Ascent of Mt Seward and its Barometrical Measurement. Mus. rep. 24 (for 1870) 1872. p.171-80. 1pl.

Mountains. Hall. Theory of Formation. Pal. N. Y. 1859. 3:66-73, 82-88, 95-96.

Muck swamps. Hall. Muck Swamps. Geol. rep. 4th dist. (for 1839) 1840. p.444-45. Geol. N. Y. pt4. 1843. p.359-60.

Muriate of lime, *see* Chlorid of lime.

Muscovite. Merrill. Localities. Mus. bul. 15. 1895. p.582. *Same*, Mus. rep. 48 (for 1894) 1895. 1:582 (2d paging).

—— —— Mus. bul. 19. 1898. p.234. *Same*, Mus. rep. 51 (for 1897) 1899. 1:234.

Merrill. Muscovite. Mus. bul. 19. 1898. p.122. *Same*, Mus. rep. 51 (for 1897) 1899. 1:122.

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[a]First use of term.

Muscovite (*continued*)

Nason. Muscovite. Mus. bul. 4. 1888. p.9.

Whitlock. Muscovite. Mus. bul. 58. 1902. p.110-11.

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Nevius, *comp.* Preliminary List of Public Geological and Mineralogical Collections in the United States and Canada. Mus. rep. 50 (for 1896) 1898. 1:45-74 (1st paging).

See also New York State Museum.

Mushroom phora. Lintner. Mushroom Phora. Ent. rep. 10 (for 1894) 1895. p.399-406. *Same*, Mus. rep. 48 (for 1894) 1895. 1:399-406 (1st paging).

Mushrooms, *see* Fungi.

Myriapoda. Additions to Collection. Ent. rep. 3, p.142; 4, p.208; 5, p.326; 6, p.190; 7, p.384; 9, p.464; 10, p.513, 519; 12, p.364; 13, p.375; 14, p.263; 15, p.620.
For dates of reports, *see* List of publications, p.264.

Nantucket pine moth. Felt. Nantucket Pine Moth. Forest, Fish and Game Com. rep. 7 (for 1901). *In press.*

Naphtha. Beck. Naphtha. Min. N. Y. 1842. p.183.

Naples quadrangle. Clarke. Stratigraphy of the Canandaigua and Naples Quadrangles. Mus. bul. 63. 2 maps. *In press.*

[a]Naples shales (Cashaqua; Gardeau; Portage). Clarke. Annelid Teeth from the Lower Portion of the Hamilton Group and from the Naples Shales of Ontario County, N. Y. Geol. rep. 6 (for 1886) 1887. p.30-32. 1pl.

Clarke. Naples Fauna. Geol. rep. 15 (for 1895) 1897. p.52-57. *Same*, Mus. rep. 49 (for 1895) 1898. 2:52-57.

Clarke. The Naples Fauna (fauna with Manticoceras intumescens) in Western New York. Geol. rep. 16 (for 1896) 1899. p.29-161. illus. 9pl. *Same*, Mus. rep. 50 (for 1896) 1899. 2:29-161. illus. 9pl.

Clarke. Naples Fauna. Mus. bul. 52. 1902. p.670.

Clarke. Naples Fauna in Western New York. Mus. mem. 6. *In press.*

Clarke & Schuchert. Naples Beds. *See* New York series.

Grabau. Naples Shales. Geol. rep. 16 (for 1896) 1899. p.233-34. *Same*, Mus. rep. 50 (for 1896) 1899. 2:233-34.

See also Cashaqua shale; Gardeau group; Portage group.

Naples valley. Luther. Stratigraphic Position of the Portage Sandstones in the Naples Valley and the Adjoining Region. Geol. rep. 15 (for 1895) 1897. p.13-14, 223-36. pl. (phot.) map. *Same*, Mus. rep. 49 (for 1895) 1898. 2:13-14, 223-36. pl. (phot.) map.
Geologic map of the township of Naples, 17x16.5cm.

Nassau county. Woodworth. Pleistocene Geology of Portions of Nassau County and Borough of Queens. Mus. bul. 48. 1901. p.617-64. pl. (phot.) maps. *Same*, Mus. rep. 54 (for 1900) 1902. 4:617-64. pl. (phot.) maps.
Sketch map of a part of Long Island, 22.5x18.5cm.

Natrolite. Beck. Natrolite. Min. N. Y. 1842. p.344.

Whitlock. Natrolite. Mus. bul. 58. 1902. p.110.

Natron. Beck. Carbonate of Soda. Natron. Min. rep. (for 1838) 1839. p.17. Min. N. Y. 1842. p.197-98.

Natural gas. Bishop. Natural Gas of Erie County. Geol. rep. 15 (for 1895) 1897. p. 346-89. *Same*, Mus. rep. 49 (for 1895) 1898. 2:346-89.

—— —— Geol. rep. 17 (for 1897) 1899. p.25-26. *Same*, Mus. rep. 51 (for 1897) 1899. 2:25-26.

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[a] Term proposed by J. M. Clarke in 1885, *see* U. S. Geol. Surv. Bul. 16. p.36.

Natural gas *(continued)*

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a See also List of publications, p.269, for fuller contents.

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[b] First use of term in original publication of this article. Science. 1899. new ser. 10:877.

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Hall. Niagara Group in Niagara County. Geol. N. Y. pt4. 1843. p.440.

Hall. Niagara Group in Orleans County. Geol. N. Y. pt4. 1843. p.433.

Hall. Niagara Group in Wayne County. Geol. N. Y. pt4. 1843. p.414.

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[a] First use of term.

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[a]Vanuxem. Niagara Group. Geol. N. Y. pt3. 1842. p.90-94.

Vanuxem. Niagara Group in Cayuga County. Geol. N. Y. pt3. 1842. p.286.

Vanuxem. Niagara Group in Madison County. Geol. N. Y. pt3. 1842. p.272.

Vanuxem. Niagara Group in Oneida County. Geol. N. Y. pt3. 1842. p.262-63.

Vanuxem. Niagara Group in Onondaga County. Geol. N. Y. pt3. 1842. p.278.

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[b]**Niagara limestone (Lockport).** Bishop. Niagara Limestone of Erie County. Geol. rep. 15 (for 1895) 1897. p.390. *Same*, Mus. rep. 49 (for 1895) 1898. 2:390.

Darton. Niagara Limestone. Geol. rep. 13 (for 1893) 1894. p.218. *Same*, Mus. rep. 47 (for 1893) 1894. p.412.

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Geddes. Niagara Limestone of Onondaga County. Ag. Soc. Trans. 19 (for 1859) 1860. p.245.

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[a] First use of term.
[b] Term first used by Hall. Amer. Jour. Sci. 1842. ser. 1. 42-58.

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Ries. Niagara Limestone of Niagara County. Geol. rep. 17 (for 1897) 1899. p.444-45. *Same*, Mus. rep. 51 (for 1897) 1899. 2:444-45.

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Ries. Niagara Limestones of Orleans County. Mus. bul. 44. 1901. p.810-11. *Same*, Mus. rep. 54 (for 1900) 1902. 3:810-11.

Ries. Coralline or Niagara Limestone of Ulster County. Geol. rep. 17 (for 1897) 1899. p.459. *Same*, Mus. rep. 51 (for 1897) 1899. 2:459.

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aNiagara shale (Rochester). Emmons. Niagara Shale. Ag. N. Y. 1846. 1:151.

Hall. Niagara Shale. Geol. N. Y. pt4. 1843. p.81-83.

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See also Crystalline rocks; Gabbros.

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Olive shale, *see* Erie division; Hamilton group.

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[a]First use of term.

Oneida county (*continued*)

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White. Report on the Relations of the Ordovician and Eo-Silurian Rocks in Portions of Herkimer, Oneida and Lewis Counties. Mus. rep. 51 (for 1897) 1899. 1:r21-54. pl. (phot.) 2 maps.
Map of the vicinity of Frankfort hill, 31.5x16.5cm.
Map of the Precambrian border in Oneida and Lewis counties, 49.5x16cm.

Oneida lake. Geddes. Oneida Lake. Ag. Soc. Trans. 19 (for 1859) 1860 p.259.

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Oneonta sandstone (Portage). Beecher, C. E., Hall, C. E. & Hall, J. W. Note on the Oneonta Sandstone in the Vicinity of Oxford, Chenango Co., N. Y. Geol. rep. 5 (for 1885) 1886. p.11.

Clarke. Oneonta Sandstones and Shales in Chenango County. Geol. rep. 13 (for 1893) 1894. p.531-57. *Same*, Mus. rep. 47 (for 1893) 1894. p.725-51.

Clarke. Stratigraphic and Faunal Relations of the Oneonta Sandstones and Shales, the Ithaca and the Portage Groups in Central New York. Geol. rep. 15 (for 1895) 1897. p.11-12, 27-81. pl. (phot.) 2 maps 25x28.5, 26x26.5cm. *Same*, Mus. rep. 49 (for 1895) 1898. 2:11-12, 27-81. pl.(phot.) 2 maps 25x28.5, 26x26.5cm.

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Darton. Oneonta Formation in Albany County. Geol. rep. 13 (for 1893) 1894. p.238-40. *Same*, Mus. rep. 47 (for 1893) 1894. p.432-34.

Prosser. Classification and Distribution of the Hamilton and Chemung Series of Central and Eastern New York. Pt1, Geol. rep. 15 (for 1895) 1897. p.12-13, 83-222. pl. (phot.) map. Pt2. Geol. rep. 17 (for 1897) 1899. p.65-315. pl. (phot.) map. *Same*, Pt1, Mus. rep. 49 (for 1895) 1898. 2:12-13, 83-222. pl. (phot.) map. Pt2, Mus. rep. 51 (for 1897) 1899. 2:65-315. pl. (phot.) map.
Pt1, Geologic map of parts of Chenango, Madison, Otsego, Schoharie and Albany counties, 58x33.5cm.
Pt2, Map showing distribution of middle and upper Devonian rocks in central-eastern New York, 61x38.5cm.
Map of Delaware county by W. L. Fisher, 34x32cm.

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[a]Vanuxem. Montrose Sandstone, or Sandstone of Oneonta. Geol. rep. 3d dist. (for 1839) 1840. p.381.

See also Portage sandstones.

Onion thrips. Lintner. Onion Thrips. Ent. rep. 11 (for 1895) 1896. p.241-47. *Same*, Mus. rep. 49 (for 1895) 1897. 1:241-47.

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Geographic and topographic map of Onondaga co. by George Geddes, 79x57.5cm.

Luther. Economic Geology. Geol. rep. 15 (for 1895) 1897. p.4-16, 237-303. pl. (phot.) 2 maps. *Same*, Mus. rep. 49 (for 1895) 1898. 2:14-16, 237-303. pl. (phot.) 2 maps.
Map of Onondaga county (uncolored) 34x34cm.
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Onondaga limestone (Upper Helderberg; Corniferous; Seneca). Bishop. Onondaga Limestone of Erie County. Geol. rep. 15 (for 1895) 1897. p.313, 331-32, 390. *Same*, Mus. rep. 49 (for 1895) 1898. 2:313, 331-32, 390.

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Darton. Onondaga Limestone. Geol. rep. 13 (for 1893) 1894. p.207-8. *Same*, Mus. rep. 47 (for 1893) 1894. p.401-2.

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Darton. Onondaga Limestone of Ulster County. Geol. rep. 13 (for 1893) 1894. p.301-2. *Same*, Mus. rep. 47 (for 1893) 1894. p.495-96.

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Onondaga limestone *(continued)*

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Hall. Onondaga Limestone in Erie County. Geol. rep. 4th dist. (for 1840) 1841. p.156-58. Geol. N. Y. pt4. 1843. p.471.

Hall. Onondaga Limestone of Genesee County. Geol. rep. 4th dist. (for 1839) 1840. p.427-29. Geol. N. Y. pt4. 1843. p.466.

Hall. Onondaga Limestone of Livingston County. Geol. rep. 4th dist. (for 1839) 1840. p.418-20. Geol. N. Y. pt4. 1843. p.460.

[a]Hall. Gray Crinoidal or Onondaga Limestone of Ontario County. Geol. rep. 4th dist. (for 1838) 1839. p.309-10. Geol. N. Y. pt4. 1843. p.456.

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[a]First use of term.

Onondaga limestone (*continued*)

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Vanuxem. Onondaga Limestone in Cayuga County. Geol. N. Y. pt3. 1842. p.288.

Vanuxem. Onondaga Limestone in Herkimer County. Geol. N. Y. pt3. 1842. p.258.

Vanuxem. Onondaga Limestone in Madison County. Geol. N. Y. pt3. 1842. p.274.

Vanuxem. Onondaga Limestone in Oneida County. Geol. N. Y. pt3. 1842. p.263.

Vanuxem. Onondaga Limestone in Onondaga County. Geol. N. Y. pt3. 1842. p.284.

Vanuxem. Onondaga Limestone in Otsego County. Geol. N. Y. pt3. 1842. p.253.

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See also Corniferous limestone; Gray sparry crinoidal limestone; Seneca limestones; Upper Helderberg group.

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Hall. Onondaga Salt Group in Niagara County. Geol. N. Y. pt4. 1843. p.440.

[a]Hall. Saliferous Group of Onondaga in Ontario County. Geol. rep. 4th dist. (for 1838) 1839. p.304-8. Geol. N. Y. pt4. 1843. p.453.

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[a] Term first used by Hall and Vanuxem in 1839.

Onondaga salt group *(continued)*

[a]Vanuxem. Red Shale and Waterlimes of Herkimer and Oneida; Saliferous Group of Onondaga. Geol. rep. 3d dist. (for 1838) 1839. p.249-74.

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Vanuxem. Onondaga Salt Group in Cayuga County. Geol. N. Y. pt3. 1842. p.286-87.

Vanuxem. Onondaga Salt Group in Herkimer County. Geol. N. Y. pt3. 1842. p.258.

Vanuxem. Onondaga Salt Group in Madison County. Geol. N. Y. pt3. 1842. p.272.

Vanuxem. Onondaga Salt Group in Oneida County. Geol. N. Y. pt3. 1842. p.263.

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[a] Term first used by Hall and Vanuxem in 1839.

Ontario county *(continued)*

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Map of the Mining District of Monroe. Min. N. Y. 1842. pl.6.

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Mather. Rocks Similar in Character to the Shawangunk Grit and Overlying Red Rocks. Geol. N. Y. pt1. 1843. p.362-65.

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Orange county *(continued)*

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Oriskany sandstone (*continued*)

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[a]Hall. Oriskany Sandstone of Ontario County. Geol. rep. 4th dist. (for 1838) 1839. p.308-9. Geol. N. Y. pt4. 1843. p.456.

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[a] Term first used by Hall and Vanuxem in 1839.

Orleans county *(continued)*

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[a] First use of term.

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Geologic map of the township of Naples, 17x16.5cm.

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[a] First use of term.

Portage sandstones (*continued*)

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[a] First use of term.

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See also Crystalline rocks.

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See also Clinton group; Niagara group.

[a] First use of term.

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[a] First use of term.

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Sketch map of a part of Long Island, 22.5x18.5cm.

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Fitch. Red Slate of Washington County. Ag. Soc. Trans. 9 (for 1849) 1850. p.834-36.

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Map of New York showing distribution of rocks most useful for road metal, 34x44cm; map showing location of quarries, 68x92cm.

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Map showing Triassic rocks of Rockland county, 45x44cm.

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a First use of term in original publication of this article. Science. 1899. new ser. 10:877.

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See also Onondaga salt group.

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See also Lorraine beds; Oneida conglomerate.

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[a] Term introduced by Dana. Manual of Geology. *rev. ed.* 1864, p.246.
[b] First use of term.

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Geologic map of the salt district, 45x24 cm.

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Map of western salt field of New York, 52.5x32.5cm.
Chart of well sections.

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Geologic map of the vicinity of Saranac lakes, 13.5x16cm.

See also Adirondacks.

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Preliminary geologic map of portions of Herkimer, Fulton, Montgomery, Saratoga and adjacent counties (uncolored) 28.5x16.5cm.

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Map of the " Noses " (colored).

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Saratoga county (*continued*)

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Scallops, *see* Lamellibranchiata.

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See also Wernerite.

Scheelite. Whitlock. Scheelite. Mus. bul. 58. 1902. p.128.

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Schenectady county (*continued*)

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Prosser. Geologic Map of Part of. Geol. rep. 15 (for 1895) 1897. facing p.87. *Same*, Mus. rep. 49 (for 1895) 1898. v.2, facing p.87.

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Darton. Schoharie Grit. Geol. rep. 13 (for 1893) 1894. p.208-9. *Same*, Mus. rep. 47 (for 1893) 1894. p.402-3.

Darton. Schoharie Grit in Albany County. Geol. rep. 13 (for 1893) 1894. p.243-44. *Same*, Mus. rep. 47 (for 1893) 1894. p.437-38.

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[a]Vanuxem. Schoharie Layers. Geol. rep. 3d dist. (for 1839) 1840. p.378.

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[a] First use of term.

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Bishop. Oil and Gas. Geol. rep. 19 (for 1899) 1901. p.r127. *Same*, Mus. rep. 53 (for 1899) 1901. 1:r127.

Clarke. Geological Map showing Distribution of Portage Group. Geol. rep. 15 (for 1895) 1897. facing p.60. *Same*, Mus. rep. 49 (for 1895) 1898. v.2, facing p.60.

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Schuyler's lake. Vanuxem. Schuyler's Lake. Geol. N. Y. pt3. 1842. p.238.

Scorodite. Beck. Scorodite. Min. N. Y. 1842. p.396.

Scorpion flies, *see* Neuropteroid insects.

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Mather. Theories of Erratic Blocks, Boulders, Scratches, etc. Geol. N. Y. pt1. 1843. p.214-21.

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Scurfy bark louse. Felt. Scurfy Bark Louse. Mus. bul. 46. 1901. p.300-4. *Same*. Mus. rep. 54 (for 1900) 1902. 4:300-4.

Scutella limestone (Becraft; Upper Pentamerus). Merrill. Scutella Limestone. Mus. bul. 19. 1898. p.157. *Same*, Mus. rep. 51 (for 1897) 1899. 1:157.

[a]Vanuxem. Scutella Limestone. Geol. rep. 3d dist. (for 1839) 1840. p.377.

See also Becraft limestone; Encrinal limestone; Pentamerus limestone.

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Secondary system, *see* Mesozoic; Upper secondary system.

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Map of Seneca co. (uncolored) 27.5x48.5cm.
Contains a bibliography.

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[a] First use of term.

Seneca county (*continued*)

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[a]Vanuxem. Seneca Limestone. Geol. rep. 3d dist. (for 1838) 1839. p.275-78; (for 1839) 1840. p.378-79. Geol. N. Y. pt3. 1842. p.144-45.

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[a] Term used by Hall and Vanuxem in 1839.

[b] First use of term in original publication of this article. Science. 1899. new ser. 10:877.

Serpentine (*continued*)

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[a] First use of term.

Sherburne formation (*continued*)

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[b]**Silurian.** Conrad. Organic Remains of Lower Transition or Silurian System. Pal. rep. (for 1837) 1838. p.107-19; (for 1838) 1839. p.57-66; (for 1839) 1840. p.200-7; (for 1840) 1841. p.25-41.

Hall. Table of Rocks. Geol. rep. 4th dist. (for 1839) 1840. p.452-53.

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[a] First use of term.

[b] For papers discussing line of division between Silurian and Devonian, *see* under Devonian.

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—— —— *revised* by Merrill. Mus. bul. 15. 1895. p.421-23. *Same*, Mus. rep. 48 (for 1894) 1895. 1:421-23 (2d paging).

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See also Talc.

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[a]Clarke. Stafford Limestone. Geol. rep. 8 (for 1888) 1889. p.60. *Same*, Mus. rep. 42 (for 1888) 1889. p.406.

Clarke. Limestones of Central and Western New York interbedded with Bituminous Shales of the Marcellus Stage with notes on their faunas. Mus. bul. 49. 1901. p.115-38. pl.8-9.

Clarke. Fauna. Mus. bul. 49. 1901. p.130-35. Mus. bul. 52. 1902. p.669.

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See also Marcellus shales.

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Starfishes. *see* Echinoderma.

State Museum. *see* New York State Museum.

Staten Island. *see* Richmond county.

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Whitlock. Staurolite. Mus. bul. 58. 1902. p.107-8.

Steatite. Emmons. Talc, or Steatite. Geol. N. Y. pt2. 1842. p.80.

Emmons. Steatite or Soapstone of St Lawrence County. Geol. N. Y. pt2. 1842. p.352-53.

Mather. Steatite of New York and Putnam Counties. Geol. rep. 1st dist. (for 1838) 1839. p.101.

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[a] First use of term.

Steatite *(continued)*

Mather. Steatite in Putnam and Dutchess Counties. Geol. N. Y. pt1. 1843. p.487.

See also Talc.

Steatitic-pyroxene, *see* Rensselaerite.

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Map of Steuben county (uncolored) 43.5x42.5cm.

Dickinson. Bluestone Quarries. Mus. bul. 61. *In press.*

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Hall. Steuben County. Geol. rep. 4th dist. (for 1838) 1839. p.324-26; (for 1839) 1840. p.395-401. Geol. N. Y. pt4. 1843. p.480-84.

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—— —— Mus. bul. 35. 1900. p.725-26. *Same*, Mus. rep. 54 (for 1900) 1902. 2:725-26.

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Stilbite. Beck. Stilbite. Min. N. Y. 1842. p.345-46.

Whitlock. Stilbite. Mus. bul. 58. 1902. p.109.

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Stone, *see* Building stone.

Stone flies, *see* Neuropteroid insects.

Stone implements. Beauchamp. Aboriginal Chipped Stone Implements of New York. Mus. bul. 16. 1897. 86p. 23pl. (phot.) *Same*, Mus. rep. 50 (for 1896) 1898. 1:3-86 (2d paging). 23pl. (phot.)

Beauchamp. Polished Stone Articles used by the New York Aborigines. Mus. bul. 18. 1897. 102p. 35pl. (phot.) *Same*, Mus. rep. 51 (for 1897) 1899. 1:3-102. 35pl. (phot.)

Morgan. Stone and Bone Implements of the Arickarees. Mus. rep. 21 (for 1867) 1871. p.25-46. 6pl.

Stoneware, *see* Pottery.

Stratigraphy, *see* New York series; *also names of formations.*

Street pavements. Smock. Street Pavements. Mus. bul. 10. 1890. p.307-8, 318-20, 322, 324, 329-30, 331-33, 335-38, 341-43, 346, 350-52.

See also Paving brick.

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[a] First use of term.

Strontia. Beck. Strontia. Min. N. Y. 1842. p.210-14.

Strontianite. Beck. Strontianite. Min. N. Y. 1842. p.212-13. Mus. rep. 3 *rev. ed.* (for 1849) 1850. p.123-24.

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Strontium. Whitlock. Strontium. Mus. bul. 58. 1902. p.85, 125-26.

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Mather. Local Details of the Economical Geology of Suffolk County. Geol. rep. 1st dist. (for 1836) 1837. p.74-91 (ed. 2. p.76-93).

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See also Long Island.

Sugar manufacture. Ries. Sugar Manufacture. Geol. rep. 17 (for 1897) 1899. p.381-84. *Same*, Mus. rep. 51 (for 1897) 1899. 2:381-84.

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Mather. Sulphur and Carburetted Hydrogen. Geol. N. Y. pt1. 1843. p.113-14.

Whitlock. Sulfur. Mus. bul. 58. 1902. p.48.

Sulfur springs. Beck. Sulphuretted or Sulphureous Springs. Min. rep. (for 1837) 1838. p.55-68. Min. N. Y. 1842. p.141-56. Mus. rep. 3 *rev. ed.* (for 1849) 1850. p.112-15.

Carr. Sulphur Springs. Geol. rep. 3d dist. (for 1839) 1840. p.386-87.

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Hall. Sulphuretted Hydrogen Springs. Geol. N. Y. pt4. 1843. p.311-14, 417, 436, 445, 491.

Mather. Hepatic or Sulphur Springs. Geol. N. Y. pt1. 1843. p.91-94, 113-14.

Peale. Sulphur Springs. Mus. bul. 15. 1895. p.567-69. *Same*, Mus. rep. 48 (for 1894) 1895. 1:567-69 (2d paging).

Sulfuretted hydrogen. Beck. Sulphuretted Hydrogen Gas. Min. rep. (for 1838) 1839. p.14. Min. N. Y. 1842. p.173.

Sulfuric acid. Beck. Sulphuric Acid. Min. rep. (for 1838) 1839. p.16. Min. N. Y. 1842. p.177-78.

Sullivan county. Beck. Lead or Zinc Mines of Sullivan and Ulster. Min. rep. (for 1838) 1839. p.49-53; (for 1840) 1841. p.6-8.

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Mather. Hudson River Group. Geol. N. Y. pt1. 1843. p.372.

Mather. Dip and Strike of Rocks. Geol. N. Y. pt1. 1843. p.621.

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Sullivan county *(continued)*

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—— —— Mus. bul. 35. 1900. p.732. *Same*, Mus. rep. 54 (for 1900) 1902. 2:732.

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Cushing. Syenites in Franklin and St Lawrence Counties. Geol. rep. 20 (for 1900) 1902. p.r25-82. *Same*, Mus. rep. 54 (for 1900) 1902 1:r25-82. Including analyses.

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Mather. Sienite of Westchester and Putnam Counties. Geol. rep. 1st dist. (for 1838) 1839. p.98-99. Geol. N. Y. pt1. 1843. p.528-29.

Mather. Sienite in the Highlands. Geol. N. Y. pt1. 1843. p.536-37.

Smock. Syenite. Mus. bul. 3. 1888. p.10-12; 10. 1890. p.204-5.

Smyth. Syenites of Adirondacks. Geol. rep. 17 (for 1897) 1899. p.474-97. *Same*, Mus. rep. 51 (for 1897) 1899. 2:474-97.

See also Augite-syenites; Crystalline rocks.

Sylvanite. Whitlock. Sylvanite. Mus. bul. 58. 1902. p.61.

Syracuse. Smock. Stone Construction in. Mus. bul. 10. 1890. p.338-41.

Tabular spar, *see* Wollastonite.

Taconic (Cambric). Clarke & Schuchert. Taconic. *See* New York series.

[a]Emmons. Taconic System. Geol. N. Y. pt2. 1842. p.135-64. Ag. N. Y. 1846. 1:45-112.

Emmons. Catalogue of the Specimens arranged by Prof. E. Emmons, as Representatives of the Taconic System, at the Close of the Geological Survey of New York in 1843. Geol. rep. 8 (for 1888) 1889. p.95-98. *Same*, Mus. rep. 42 (for 1888) 1889. p.441-44.

Hall. Organic Remains. Pal. N. Y. 1847. 1:319-20.

Lincklaen. Taconic System. Mus. rep. 14 (for 1860) 1861. p.50.

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Mather. Ores found in the Champlain, Taconic and Metamorphic Rocks. Geol. N. Y. pt1. 1843. p.488-509.

Vanuxem. Taconic System. Geol. N. Y. pt3. 1842. p.15, 22-23, 195.

See also Hudson river group.

Taconic sandstone. Fitch. Taconic Sandstone of Washington County. Ag. Soc. Trans. 9 (for 1849) 1850. p.838-43.

Taconic slate. Fitch. Taconic Slate of Washington County. Ag. Soc. Trans. 9 (for 1849) 1850. p.830-34.

Talc. Beck. Talc. Min. N. Y. 1842. p.284-85.

Hunt. Talc. Mus. rep. 21 (for 1867) 1871. p.79.

Merrill. Talc. Mus. bul. 15. 1895. p.556. *Same*, Mus. rep. 48 (for 1894) 1895. 1:556 (2d paging).

—— —— Mus. bul. 19. 1898. p.227. *Same*, Mus. rep. 51 (for 1897) 1899. 1:227.

Nevius. Talc Industry of St Lawrence County. Mus. rep. 51 (for 1897) 1899. 1:r119-27. pl. (phot.)

Smyth. Talc of St Lawrence and Jefferson Counties. Geol. rep. 13 (for 1893) 1894. p.511-14. *Same*, Mus. rep. 47 (for 1893) 1894. p.705-8.

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[a] First use of term.

Talc (*continued*)

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Whitlock. Talc. Mus. bul. 58. 1902. p.113-14.

See also Steatite.

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Mather. Talcose Slate. Geol. rep. 1st dist. (for 1838) 1839. p.129-30.

Mather. Talcose Slate of Westchester and Putnam Counties. Geol. rep. 1st dist. (for 1838) 1839. p.88-89.

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Tentaculite limestone (Manlius). Darton. Tentaculite Beds. Geol. rep. 13 (for 1893) 1894. p.215. *Same*, Mus. rep. 47 (for 1893) 1894. p.409.

Darton. Tentaculite Limestones in Albany County. Geol. rep. 13 (for 1893) 1894. p.247-48. *Same*, Mus. rep. 47 (for 1893) 1894. p.441-42.

Darton. Tentaculite Limestone in Ulster County. Geol. rep. 13 (for 1893) 1894. p.305-6. *Same*, Mus. rep. 47 (for 1893) 1894. p.499-500.

[a]Mather. Tentaculite Limestone. Geol. rep. 1st dist. (for 1839) 1840. p.238. Geol. N. Y. pt1. 1843. p.326. 350.

Mather. Fossils. Geol. N. Y. pt1. 1843. p.350.

Ries. Tentaculite Limestone. Geol. rep. 17 (for 1897) 1899. p.369. *Same*, Mus. rep. 51 (for 1897) 1899. 2:369.

—— —— *revised*. Mus. bul. 44. 1901. p.760, 763. *Same*, Mus. rep. 54 (for 1900) 1902. 3:760, 763.

Ries. Tentaculite Limestones of Albany County. Geol. rep. 17 (for 1897) 1899. p.430. *Same*, Mus. rep. 51 (for 1897) 1899. 2:430.

—— —— *revised*. Mus. bul. 44. 1901. p.771. *Same*, Mus. rep. 54 (for 1900) 1902. 3:771.

Ries. Tentaculite Limestones of Herkimer County. Geol. rep. 17 (for 1897) 1899. p.438. *Same*, Mus. rep. 51 (for 1897) 1899. 2:438.

—— —— *revised*. Mus. bul. 44. 1901. p.788. *Same*, Mus. rep. 54 (for 1900) 1902. 3:788.

Ries. Tentaculite Limestones of Schoharie County. Mus. bul. 44. 1901. p.816-18. *Same*, Mus. rep. 54 (for 1900) 1902. 3:816-18.

Ries. Tentaculite Limestone of Ulster County. Geol. rep. 17 (for 1897) 1899. p.457-58. *Same*, Mus. rep. 51 (for 1897) 1899. 2:457-58.

—— —— *revised*. Mus. bul. 44. 1901. p.823. *Same*, Mus. rep. 54 (for 1900) 1902. 3:823.

Smock. Tentaculite Limestone. Mus. bul. 3. 1888. p.22; 10. 1890. p.212.

—— —— *revised* by Merrill. Mus. bul. 15. 1895. p.427. *Same*, Mus. rep. 48 (for 1894) 1895. 1:427 (2d paging).

—— —— *revised* by Merrill. Mus. bul. 19. 1898. p.201. *Same*, Mus. rep. 51 (for 1897) 1899. 1:201.

Smock. Quarries. Mus. bul. 3. 1888. p.94-134; 10. 1890. p.238-55.

—— —— *revised* by Merrill. Mus. bul. 15. 1895. p.432-47. *Same*, Mus. rep. 48 (for 1894) 1895. 1:432-47 (2d paging).

See also Manlius limestone.

Tephroite. Beck. Tephroite. Min. N. Y. 1842. p.455.

Hunt. Tephroite, Willemite. Mus. rep. 21 (for 1867) 1871. p.77.

Terenite. Beck. Terenite. Min. N. Y. 1842. p.444.

Emmons. Pyramidal Atelene Picrosmine: Terenite. Geol. rep. 2d dist. (for 1836) 1837. p.152 (ed.2. p.154).

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[a]First use of term

Terra cotta. Merrill. Directory of Manufacturers. Mus. bul. 15. 1895. p.502-18. *Same*, Mus. rep. 48 (for 1894) 1895. 1:502-18 (2d paging).

Ries. Terra Cotta. Mus. bul. 12. 1895. p.235-37. Mus. rep. 48 (for 1894) 1895. 1:235-37 (2d paging).

—— —— *revised.* Mus. bul. 35. 1900. p.758-64, 904-5. *Same*, Mus. rep. 54 (for 1900) 1902. 2:758-64, 904-5.

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Tertiary. Conrad. Tertiary Formation. Pal. rep. (for 1840) 1841. p.46-48.

Emmons. Tertiary. Geol. rep. 2d dist. (for 1836) 1837. p.120 (ed.2, p.122); (for 1837) 1838. p.232-39. Geol. N. Y. pt2. 1842. p.127-34. Ag. N. Y. 1846. 1:202-6.

Emmons. Tertiary Beds of Clinton. Geol. N. Y. pt2. 1842. p.322-24.

Emmons. Tertiary of Essex County. Geol. N. Y. pt2. 1842. p.283-84.

Emmons. Tertiary of St Lawrence. Geol. N. Y. pt2. 1842. p.363-65.

Emmons. Fossils. Geol. N. Y. pt2. 1842. p.128, 283.

Hall. New Red Sandstone and Tertiary. Geol. N. Y. pt4. 1843. p.317.

Mather. Tertiary Deposits. Geol. N. Y. pt1. 1843. p.246-47.

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Merrill. Life of the Tertiary Period. Mus. bul. 19. 1898. p.175. *Same*, Mus. rep. 51 (for 1897) 1899. 1:175.

Tetrahedrite. Whitlock. Tetrahedrite. Mus. bul. 58. 1902. p.62.

Thomsonite. Beck. Thomsonite. Min. N. Y. 1842. p.350-51.

Thysanura. Additions to Collection. Ent. rep. 6, p.190; 10, p.513; 13, p.375; 15, p.619; 17, p.824.

For dates of reports, *see* List of publications, p.264.

Tile. Lincoln. Tile Manufacture of Seneca County. Geol. rep. 14 (for 1894) 1895. p.105-11. *Same*, Mus. rep. 48 (for 1894) 1895. 2:105-11.

See also Decorative tile; Drain tile; Floor tile; Roofing tile.

Till. Lincoln. Till in Seneca County. Geol. rep. 14 (for 1894) 1895. p.78-79. *Same*, Mus. rep. 48 (for 1894) 1895. 2:78-79.

Tin. Beck. Tin Ore. Min. N. Y. 1842. p.455.

Whitlock. Cassiterite (stream tin). Mus. bul. 58. 1902. p.75.

Tioga county. Beck. Mineralogy. Min. rep. (for 1839) 1840. p.100.

Bishop. Oil and Gas. Geol. rep. 19 (for 1899) 1901. p.r133. *Same*, Mus. rep. 53 (for 1899) 1901. 1:r133.

Dickinson. Bluestone Quarries. Mus. bul. 61. *In press.*

Fenno. Plants of the Susquehanna Valley and Adjacent Hills of Tioga County. Bot. rep. (for 1902). *In press.*

Ries. Brick Yards. Mus. bul. 12. 1895. p.210, 250. *Same*, Mus. rep. 48 (for 1894) 1895. 1:210, 250 (2d paging).

—— —— Mus. bul. 35. 1900. p.728. *Same*, Mus. rep. 54 (for 1900) 1902. 2:728.

Smock. Building Stone Quarries. Mus. bul. 3. 1888. p.85; 10. 1890. p.275-76.

—— —— *revised* by Merrill. Mus. bul. 15. 1895. p.409. *Same*, Mus. rep. 48 (for 1894) 1895. 1:409 (2d paging).

Vanuxem. Tioga County. Geol. N. Y. pt3. 1842. p.296-98.

Titaniferous iron ore, *see* Ilmenite.

Titaniferous magnetite, *see* Magnetite.

Titanite. Beck. Sphene. Min. N. Y. 1842. p.433-36. Mus. rep. 3 *rev. ed.* (for 1849) 1850. p.150-51.

Hunt. Sphene. Mus. rep. 21 (for 1867) 1871. p.86.

Titanite (*continued*)

Nason. Sphene or Titanite. Mus. bul. 4. 1888. p.7-8, 15.

Whitlock. Titanite. Mus. bul. 58. 1902. p.115-16.

Titanium. Beck. Titanium. Min. rep. (for 1838) 1839. p.53. Min. N. Y. 1842. p.55-56, 427-37.

Tompkins county. Beck. Mineralogy. Min. rep. (for 1839) 1840. p.100-1.

Clarke. Geological Map showing Distribution of Portage Group. Geol. rep. 15 (for 1895) 1897. facing p.60. *Same*, Mus. rep. 49 (for 1895) 1898. v.2, facing p.60.

Dickinson. Bluestone Quarries. Mus. bul. 61. *In press.*

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—— —— Ent. rep. 17 (for 1901) 1902. p.796-97. (Mus. bul. 53).

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Hall. Tompkins. Geol. rep. 4th dist. (for 1838) 1839. p.317-21. Geol. N. Y. pt4. 1843. p.475-77.

Ries. Brick Yards. Mus. bul. 12. 1895. p.210-11, 250. *Same*, Mus. rep. 48 (for 1894) 1895. 1:210-11, 250 (2d paging).

—— —— Mus. bul. 35. 1900. p.728-31. *Same*, Mus. rep. 54 (for 1900) 1902. 2:728-31.

Ries. Limestone Formations. Mus. bul. 44. 1901. p.819-20. *Same*, Mus rep. 54 (for 1900) 1902. 3:819-20.

Smock. Building Stone Quarries. Mus. bul. 3. 1888. p.81-83; 10. 1890. p.272-73.

—— —— *revised* by Merrill. Mus. bul. 15. 1895. p.406-7. *Same*, Mus. rep. 48 (for 1894) 1895. 1:406-7 (2d paging).

Vanuxem. Tompkins County. Geol. N. Y. pt3. 1842. p.298-99.

Topaz. Beck. Topaz. Min. N. Y. 1842. p.455.

Whitlock. Topaz. Mus. bul. 58. 1902. p.102-3.

Topographic sheets. Merrill. Topographic Sheets. Geol. rep. 19 (for 1899) 1901. p.r14-15. map. *Same*, Mus. rep. 53 (for 1899) 1901. 1:r14-15. map.

Map of New York showing atlas sheets surveyed by the United States Geological Survey in cooperation with the state engineer and surveyor. Jan. 1, 1900 (uncolored) 22.5x17.5cm.

See also Albion quadrangle; Amsterdam quadrangle; Brockport quadrangle; Brooklyn quadrangle; Canandaigua quadrangle; Harlem quadrangle; Hempstead quadrangle; Little Falls quadrangle; Medina quadrangle; Mooers quadrangle; Naples quadrangle; Olean quadrangle; Oyster Bay quadrangle; *also under names of counties.*

Topography, *see* Physical geography.

Torbernite. Whitlock. Torbernite. Mus. bul. 58. 1902. p.21.

Tortoises, *see* Reptiles.

Tourmalin. Beck. Tourmaline. Min. N. Y. 1842. p.356-60. Mus. rep. 3 *rev. ed.* (for 1849) 1850. p.142.

Hunt. Tourmaline. Mus. rep. 21 (for 1867) 1871. p.83.

Nason. Newcomb Tourmalines. Mus. bul. 4. 1888. p.5-10.

Whitlock. Tourmalin. Mus. bul. 58. 1902. p.107.

Tracheata (paleozoic). Clarke. Type Specimens in New York State Museum. Mus. bul. 65. *In press.*

Transition argillite. Horton. Transition Argillite. Geol. rep. 1st dist. (for 1838) 1839. p.141-45.

See also Hudson river group; Utica shale.

Transition limerock (Eaton), *see* Black river limestone.

Transition sandrock (Eaton), *see* Calciferous sandrock.

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[a]Term first used by Conrad and Vanuxem in 1838.

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[a]Term first used by Conrad and Vanuxem in 1838.

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[a] First use of term.

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COMPILED UNDER THE DIRECTION OF
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